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Facial fractures

■ *Merritte M. Maxwell, D.D.S., Annapolis, Md.*

Although wars are ordinarily devastating and destructive affairs, a compensatory constructive creative influence must be recognized in that such sociologic upheavals do initiate and accelerate scientific development in all fields. This is particularly true in the field of oral and maxillofacial surgery which has as its objective the restoration of function and cosmetic form for those who have been subjected to traumatic injuries. Review of the literature during and subsequent to World War II gives ample evidence of accelerated development and improvement in the early care, diagnosis and treatment of injuries of the facial skeleton and soft tissues. The purpose of this essay is to present some of this evidence and also to discuss classification, changed concepts, controversial methods and improved technics as they relate to facial fractures.

■ *Classification*

As the skull is composed of 22 bones, 14 in the facial skeleton and 8 in the cranium, head injuries may present a great variety of fractures. The character, force and direction of traumatic elements producing fractures are also multiple and exceedingly variable. These and other variables make any attempt to formulate an all inclusive and complete classification of facial fractures a difficult and complicated problem.

Fry[1] and co-workers have used the direction of fractures related to displacements of the adjacent bony segments as the basis for partial classification of fractures occurring in the mandible. They use the terms "favorable" and "unfavorable" to denote, respectively, nondisplacement or displacement of the fractured parts.

Thoma[2] broadly classifies mandibular fractures, exclusive of those of the condyle, into five groups. The classification for two of these groups is predicated upon the location of fractures of the body

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The opinions or assertions contained in this article are the private ones of the author and are not to be construed as official or reflecting the views of the Navy Department or the naval service at large.

Captain (DC), U. S. Navy; head of the dental department, U. S. Naval Academy, Annapolis, Md.

1. Fry, W. K., Shepherd, P. R., Mcleod, A. C., and Parfitt, G. J.: *The Dental Treatment of Maxillo-Facial Injuries*. Philadelphia: J. B. Lippincott Co., 1943, p. 5-23.

2. Thoma, K. H.: *Textbook of Oral Surgery*. St. Louis: The C. V. Mosby Company, 1948, vol. 1, p. 495-497.

of the mandible relative to teeth remaining in the dental arch; the three other groups, dealing with fractures of the angle, of the ramus and of the edentulous mandible, represent a simple site classification. His classification of condylar fractures,[3] referring primarily to fracture location and position of the head of the condyle, appears to be the most detailed and complete presented to date. The Chalmers J. Lyons Club classification[4] stresses the pull of the external pterygoid muscle and the fracture planes as they affect the displacement of the condyle head.

Fractures of the maxilla and other bones of the middle third of the face apparently have not received the same degree of attention for purposes of classification as have those of the mandible, possibly because the comparative frequency rate of fracture is about one to five. The exposed position of the lower jaw relative to other facial bones readily explains the greater frequency of mandibular fractures. Erich and Austin[5] designate four groups of fractures under fractures of the maxilla; three of these groups involve facial bones in addition to the maxilla, while the fourth group considers simple fractures of the maxillary alveolar process. A manual prepared by the National Research Council[6] lists only two classes of fractures of the maxilla; namely, unilateral fracture and bilateral horizontal fracture. Thoma's classification into four basic types is similar to Erich's groups, differing only by the addition of comminuted fractures.

Classification in science deals with an objective grouping of entities having similar attributes, such grouping being based on the most important common characteristics and relationships. Opportunity seems to be presented for an intensive study and evaluation of case reports of facial fractures for the purpose of a more comprehensive and complete classification. As reported by Thoma it would appear logical, particularly from the oral surgical viewpoint, to predicate such classification upon the relationship between the site of facial fractures and impairment of masticatory function. Impaired function would necessarily include a study of the relationships of teeth remaining in the dental arches and of the alveolar ridges. Working with a classification of this order, having impaired masticatory function as a common denominator, would serve to establish a greater uniformity of treatment procedure for distinct types of facial fracture.

■ *Emergency Care*

An oral surgeon should attend promptly all cases of facial injury be they civilian or military. Experience indicates too frequent failure to recognize the presence of fractured facial bones, particularly when deformity is not excessive and when fractures are masked by superimposed swellings. The administration of prompt and proper emergency maxillofacial care has an important bearing on the degree of success to be obtained in many instances. Obviously, as Converse[7] states in

3. Thoma, K. H., Fractures and Fracture Dislocations of the Mandibular Condyle. *J. Oral Surg.* 3:3 (Jan.) 1945.

4. Chalmers J. Lyons Club, Fractures Involving the Mandibular Condyle. *J. Oral Surg.* 5:45 (Jan.) 1947.

5. Erich, J. B., and Austin, L. T., *Traumatic Injuries of Facial Bones*. Philadelphia: W. B. Saunders, 1944, p. 159.

6. National Research Council, *Plastic and Maxillofacial Surgery*. Philadelphia: W. B. Saunders, 1942, p. 313-314.

7. Converse, J. M., Early and Late Treatment of Gunshot Wounds of the Jaws in French Battle Casualties in North Africa and Italy. *J. Oral Surg.* 3:112 (April) 1945.

Fig. 1.—Left and center: Fracture of the anterior mandible associated with bilateral dislocation of the condyles. Fracture line is not clear. Right: Occlusal view displays character of fracture

writing of gunshot wounds of the jaws, the first or early phase of treatment consists primarily of lifesaving measures such as the prevention of asphyxia and the control of hemorrhage and shock. Yet the value of additional supplemental early treatment must not be minimized. Insofar as the general physical condition of the patient will permit all fractures of facial bones should be reduced as soon as possible. Early gross reduction of multiple facial fractures by simple finger or instrument manipulation and uncomplicated immobilization by wire, ligatures or elastics may mean the difference between a good and poor end result.[8] Modern chemotherapeutic measures, administered promptly, have given added justification for instituting early treatment of facial fractures, even for those cases demonstrating fracture of the cribriform plate.

■ *Advantages of Early Care*

Before the development of swelling and possible infection, palpation without trauma and visual examination will serve to identify easily normal anatomic landmarks which present a reliable basis of orientation for determining the location, nature and extent of fractures. This examination is an important aid for a more accurate evaluation of roentgenographic findings. Standard roentgenograms in some instances will not reveal the presence of certain facial fractures which otherwise may be easily discernible (Fig. 1).

The determination of the advisability of immediate or delayed suturing in fracture cases complicated by lacerations requires keen surgical judgment. It is a controversial matter, particularly in cases of contaminated wounds and those involving the loss of variable amounts of soft tissue.[7-9] Fortunately the chemotherapeutic agents, such as the antibiotics and sulfonamides, considerably minimize the risk of uncontrollable infection attending immediate suture of facial wounds. Nevertheless meticulous care should be exercised by conservative débridement and thorough cleansing of the wound. Con-

8. Maxwell, M. M., Schork, C. J., and Heidt, E., Rationale of Treatment in Maxillofacial Injuries With Report of Four Cases. *J. Oral Surg.* 4:269 (Oct.) 1946.

9. Clarkson, P., Primary Closure of Face and Jaw Wounds. *J. Oral Surg.* 3:346 (Oct.) 1945.

servation of viable tissue is a must. It is my opinion that hemostasis with prompt suturing has distinct cosmetic and functional advantages when utilized prior to the advent of swelling and infection. Fractured facial bones protruding from a wound should be protected by a sutured soft tissue overlay if exposure to infection and sequestration is to be minimized. The early repair of facial lacerations, meticulously accomplished, stimulates prompt healing, controls inflammatory reaction and limits the development of cicatricial tissue.

Immediate closure would necessarily be avoided in instances of suppurating, frankly infected wounds, repair being delayed until subsidence of the infectious inflammatory process. Conservative or partial closure is the method of choice when sizeable segments of facial tissue are evulsed, effort being directed toward maintaining the remaining tissues in as normal an anatomic relationship as possible (Fig. 2, left). The approximation of gaping wounds over fractured areas could circumvent proper reduction unless the initial treatment provided for fixation of the fractured bones in a functional anatomic position. It is better to forego early closure and treat such wounds as "open wounds" rather than establish a not easily correctible bony deformity (Fig. 2, right).

■ *Early Examination*

Examination of a conscious, well oriented patient is simplified considerably by elicitation of subjective symptoms. For the unconscious and dazed patient, the objective signs are the guides to tentative diagnosis. When the cardiovascular, respiratory and nervous systems of the patient are considered to be within the limits of safety, attention may be directed to a regional examination. This examination can be divided into three phases and recorded.

VISUAL—Visual inspection of the normal anatomic landmarks will disclose gross displacements of the facial structures, asymmetries and facial paralysis due to an injury of the facial nerve. The presence and character of any discharges from the nares, ears and eyes and the presence of crushing or penetrating wounds of the cranium should be noted in order to determine the possibility of meningeal involvement. The location, depth, character and extent of lacerations with identification of the injured tissues should be observed; swellings and ecchymoses should be recorded.

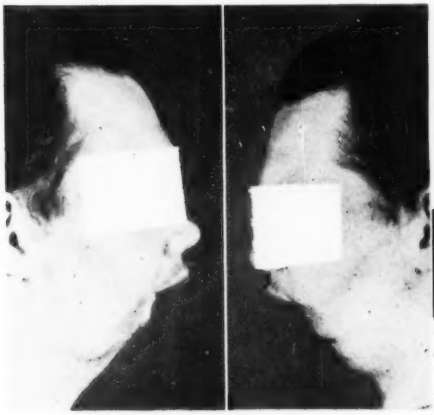
In the conscious patient the integrity of the motor nerve supply to the various muscles may be tested; impairment of sensory enervation may be recognized as a subjective symptom. Observance of the pupils of the eyes and of the positions of the globes is indicated.

Intraoral inspection, requiring close scrutiny with the aid of a good light, entails visualization of the number, position and condition of all teeth present, and, most important, their occlusal relationship, which serves as a cardinal symptom of fractured jaw bones even when displacement is minor. The integrity and relationship of edentulous alveolar ridges, presence or absence of intraoral lacerations, or other abnormalities of the palate, floor of the mouth, tongue, oral pharynx and vestibular mucosae, should be seen.

PALPATION—Bimanual palpation, supplementing the visual inspection, may be conducted simultaneously. Intraoral and extraoral digital examination, tracing the outlines of the various facial bones, will reveal points of tenderness and disruptions and depressions of normal bony contours. The possible presence of foreign bodies, such as metallic fragments, may also be felt. Purposeful manipulation, for the detection of crepitus, a painful and unnecessary procedure, should be avoided.

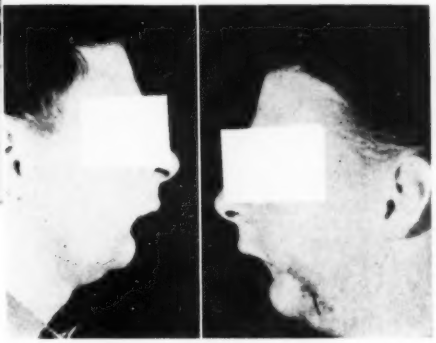
ROENTGENOGRAPHIC—Roentgenographic examination demonstrating evidence of fractured bones is generally considered to be conclusively diagnostic, particularly in long bone roentgenology. Skull roentgenology poses a more difficult problem because of the multiplicity of shadows with different gradients of contrast which are encountered. Consequently roentgenographic views of the skull present greater opportunity for interpretative errors.

It is common practice to supplement the standard views with additional views as may be necessary for ruling out pseudofracture lines and to trace out the degree and extent of actual fractures and displacements. Intraoral views generally provide excellent definition, and in some instances they confirm or deny evidences of fracture seen in skull roentgenograms; in addition they sometimes show fractures not seen in the skull views, such as fractures of the symphysis and alveolar process. Better visualization of teeth actually in lines of fracture, as differentiated from those apparently so located, may be accomplished by intraoral roentgenography.



Right: Primary suture; union in malposition. Normal facial form will be difficult to establish

Fig. 2.—Left: Primary suture; insufficient soft tissue for reception of graft and restoration of facial form



■ *General Comment*

Bedside roentgenology with the portable x-ray unit, for severely injured facial cases, in my experience has not been entirely satisfactory. Difficulty in obtaining accurate angulation of the tube, in placement of cassettes and variations in the line supply of current are some of the variables responsible for the inferior character of bedside skull roentgenograms. Nevertheless such views, even though of substandard quality, are frequently useful in making a decision as to the character of early treatment to be administered.

Psychosomatic influences related to facial fractures, complicated by lacerations and loss of tissue, are of great importance. Patients subjected to severe injuries of the face are prone to believe that they are mutilated to such a degree that the restoration of a normal appearance is beyond human professional skill. Encouragement and assurance that combined specialized skills applied over a period of time will be successful in making such patients presentable members of society serve to generate hopeful attitudes and to gain active cooperation without which a desirable end result is difficult to obtain. However, exaggerations should be avoided and conservative, well considered appraisals should be given so that in the event of unforeseen setbacks or complications the patients' confidence in a favorable outcome will in no way be lessened or lost.

Psychotic patients may present difficult problems requiring special management in conjunction with a psychiatrist. For some of these, particularly those who are obstreperous and noncooperative, treatment, as a matter of necessity, may have to be deferred until the situational psychosis or other mental aberration is brought under control. It is not uncommon for such unrestrained patients to remove or break treatment appliances. As a temporary expedient, treatment may have to be restricted to emergency care only.

Two basic principles underscore and dictate the elaboration of all plans of treatment for facial fractures. First, and most important, is the restoration of function within normal limits, and second is restoration of cosmetic form. These two principles are so intimately related that ordinarily the satisfactory accomplishment of one will serve to fulfill the requirements of the other. However, when compromise or adjustment must be made between these two objectives, as sometimes happens in cases of multiple and comminuted fractures, restored function should receive a prior consideration. An intensive study of the occasional case will permit the development of a treatment plan whereby better function or cosmetic result may be achieved than that which existed prior to injury. Occasionally a traumatic injury eliminates the need for corrective surgical treatment such as mandibular osteotomy or ostectomy (Fig. 3).

Treatment is dependent upon diagnosis. This point cannot be overemphasized. Prior to the present decade mechanical gadgets of all types were promoted by overenthusiastic individuals as panaceas for the treatment of any and all types of facial fractures. Fortunately this era has passed; emphasis is now placed properly upon comprehensive diagnosis as the basis for a rational plan of treatment. It is not my intention to analyze and evaluate the

Fig. 3.—Left: Open bite relationship existing prior to fracture. Center: Bilateral fracture of body of mandible. Right: Improved incisal relationship subsequent to reduction and immobilization

multiplicity of surgical and mechanical methods available for the treatment of facial fractures. As a general rule the simplest type of mechanical appliance which will accomplish reduction and provide satisfactory immobilization should be selected from the many which are available.

Diagnosis of facial fractures, carefully and accurately accomplished, is the basis for the development of a rational plan of treatment. Dependent upon the severity and extensiveness of the facial injuries, diagnosis ranges from a relatively simple problem entirely within the cognizance of the oral surgeon to a highly complex consultative investigation participated in by the neurosurgeon, oral surgeon, otolaryngologist and plastic surgeon. Most important, in serving the best interests of the patient, is the development of a treatment pattern whereby the special skills are operatively applied in sequential order timed to produce the best possible functional and cosmetic end result. As a simple illustration, a depressed fracture of the malar bone associated with diplopia or other abnormal eye involvement necessitates preoperative and postreduction examination by an opthalmologist.

■ *Five Phases of Treatment*

In the interest of clear thinking and orderly arrangement it appears advisable to consider the treatment of facial fractures as a sequence of five phases. The first phase, emergency and early care, indicating the essentials and technic of initial examination, has been discussed broadly in the forepart of this paper. Information gained at this time concerning the damage to the facial skeleton in the case of the severely injured patient, although incomplete, will be sufficient for a tentative diagnosis. The application of simple emergency measures, some of which have been mentioned previously, will do much to give greater comfort to the patient by stabilization of the fractured parts.

Cases uncomplicated by serious systemic symptoms may be promptly carried through to the second phase of treatment which concerns itself with establishment of diagnosis. The more severely injured patients, especially those with cerebral complications under the initial care of the neurosurgeon, will usually require more time to establish diagnosis because the patient's condition may preclude the utilization of necessary diagnostic meas-

ures. This second phase includes the diagnostic procedures specified under emergency care and additional information and material which may be required such as study models, photographs, medical laboratory data, repeat or supplemental roentgenograms and service consultations.

An evaluation of all the diagnostic data leads to formulation of a treatment plan, which may be considered the third phase of treatment. Careful consideration and evaluation of the pooled findings, opinions and conclusions of all the specialist services interested in the case establish a rational treatment plan which should include a treatment schedule listing in chronological order all prospective treatment procedures and operations. All data should be made a matter of written record.

Sketches of anterior and lateral views of the skull on which are plotted all fracture lines and displacements serve as excellent records graphically demonstrating the location and extent of the initial bony injuries; comparison of these sketches with similar ones made at a later date pictorially portrays the progress of treatment. It is not only necessary to have a clear picture of the location and extent of all fractures but it is equally important to appreciate fully and to understand the comparative value and efficiency of the various devices, methods and operations for successful reduction and immobilization of facial fractures.

The planned treatment procedures should include only those which may be well tolerated by the particular patient under consideration and those which will most expeditiously accomplish the desired cosmetic and functional end result. Therefore, dependent upon the knowledge, experience and skill of the surgeon, it is readily apparent that selection may be made from several approved methods of treatment procedure, all of which may achieve approximately the same end. As a matter of fact, the application of different methods of treatment accelerates scientific development by presenting a splendid opportunity for comparison and evaluation of results obtained with diverse technics.

The fourth phase of treatment, termed definitive treatment, concerns itself with placing into effect the treatment schedule formulated as a part of the treatment plan. This is the phase of rational therapeutics in that it is based upon comprehensive diagnosis with a proved knowledge of the effects to be expected in using the prescribed method of treatment. This plan is therefore sharply differentiated from emergency care treatment, which may be largely symptomatic in nature.

Definitive treatment includes the application of all those measures planned to bring about an optimum functional and cosmetic end result. Among the more important of these measures are: application and periodic adjustment of devices to obtain reduction and immobilization of fractures; open or closed operations for reduction and wiring of fractures; plastic procedures for the repair of wounds and defects; roentgenographic examinations to determine case progress; balanced and adequate diet for nutritional welfare of the patient; diet supplements such as the protein hydrolysates to facilitate tissue repair; finally, removal of appliances.

The fifth phase of treatment, the so-called follow up, concerns itself with checking the efficacy of previously ren-

dered treatment. It is during this period that mastication may be improved by dental restorative treatment. Any deterioration or improvement in the functions of the previously injured skin, muscles, bones, nerves and blood vessels should be noted. Obliteration of scars and improvement of muscular function may be expected ordinarily with the passage of time. Physiotherapeutic measures such as the use of heat, light, massage and exercise may be indicated to improve functions and cosmetics by circulatory stimulation of the affected parts. Photographs and roentgenograms taken at the termination of treatment are important parts of case histories; they are particularly useful for illustrating case reports prepared for publication.

■ *Open Reduction*

It may be desirable to discuss briefly one of the more important trends in the treatment of facial fractures which has been particularly noticeable during the past decade. Although open reduction of fractures of the facial skeleton has been an accepted operative procedure in selected cases for many years, two developments have stimulated greater use of this approach. The introduction of tantalum and other metals, which are well tolerated by the tissues, and the better protection against infection afforded by the use of modern chemotherapy and penicillin are important developments encouraging the greater employment of open reduction.

When indicated, direct access to and visualization of the fractured bones, permitting manual reduction and immobilization, have the great advantage of insuring good approximation of the displaced bony segments. This method has special indication in the case of the wholly or partially edentulous mandible having no teeth available for reduction and immobilization by splinting or wiring.

The consensus of most oral surgeons appears to favor open reduction only when a good approximation and functional result cannot be expected by the use of a closed method. Rational therapy supports this opinion. Closed reduction is the method of choice unless clear-cut indications necessitate the open approach. Some of these indications are malunion, nonunion, comminution and foreign bodies in the fractured region.

■ *Summary*

1. A complete classification of facial fractures, based on the relationship between the site of fracture and masticatory dysfunction, would tend to establish greater uniformity in treatment procedures.

2. Early oral surgical care of facial fractures may be the determinant of either a favorable or unfavorable cosmetic and functional result.

3. Early regional examination of facial fractures is considered to be an inseparable triad: visual inspection; bimanual palpation, and roentgenographic study.

4. The immediate repair of facial soft tissue lacerations in the presence of subjacent fractures usually is advisable.

5. Delayed or incomplete suture should be used in the presence of frank infection and when immediate suture would create a facial bony deformity difficult to correct.

6. Comprehensive diagnosis is the basis for the administration of rational treatment.

7. Treatment of facial fractures is considered as a sequence of five phases: emergency and early care; establishment of diagnosis; plan of treatment; administration of definitive treatment; follow up procedure.

8. Open reduction has the great advantage of direct approximation of fractured bones. Its use is indicated especially when accurate reduction cannot be obtained by the closed method.

Training aid for third molar surgery

■ *Charles R. Shea, D.D.S., Washington, D. C., and John V. Niiranen, D.D.S., Bethesda, Md.*

In teaching oral surgery, the demonstration of proper instrumentation and procedures has often presented the instructor with a serious problem. Only a limited number of students can actually see into the mouth during an operation, and it is difficult for the student to see the detailed instrumentation and procedures in the field of operation. The problem of the instructor, therefore, has been to illustrate surgical technics visually as well and as clearly as he would like.

Since the use of visual aids and training models for the demonstration of technics is an accepted method of teaching, a model was devised for demonstration of the removal of impacted third molars.

The teaching model was made from an impression of a mandibular arch having a normal number of teeth, except that the third molars were not erupted. The mandibular arch was then duplicated in methyl methacrylate in tooth and tissue colors. Next, the mucous membrane from the first bicuspid region to the posterior extension of the model was removed, and in its place a flexible vinyl resin mucous membrane was substituted, which had been prefabricated from a metal mold. A square opening was cut in the model immediately distal to the second molar, and in this opening a plastic cup approximately 1¼ inches square was placed which would later receive the extracted tooth. A screw was inserted in the distal portion of the

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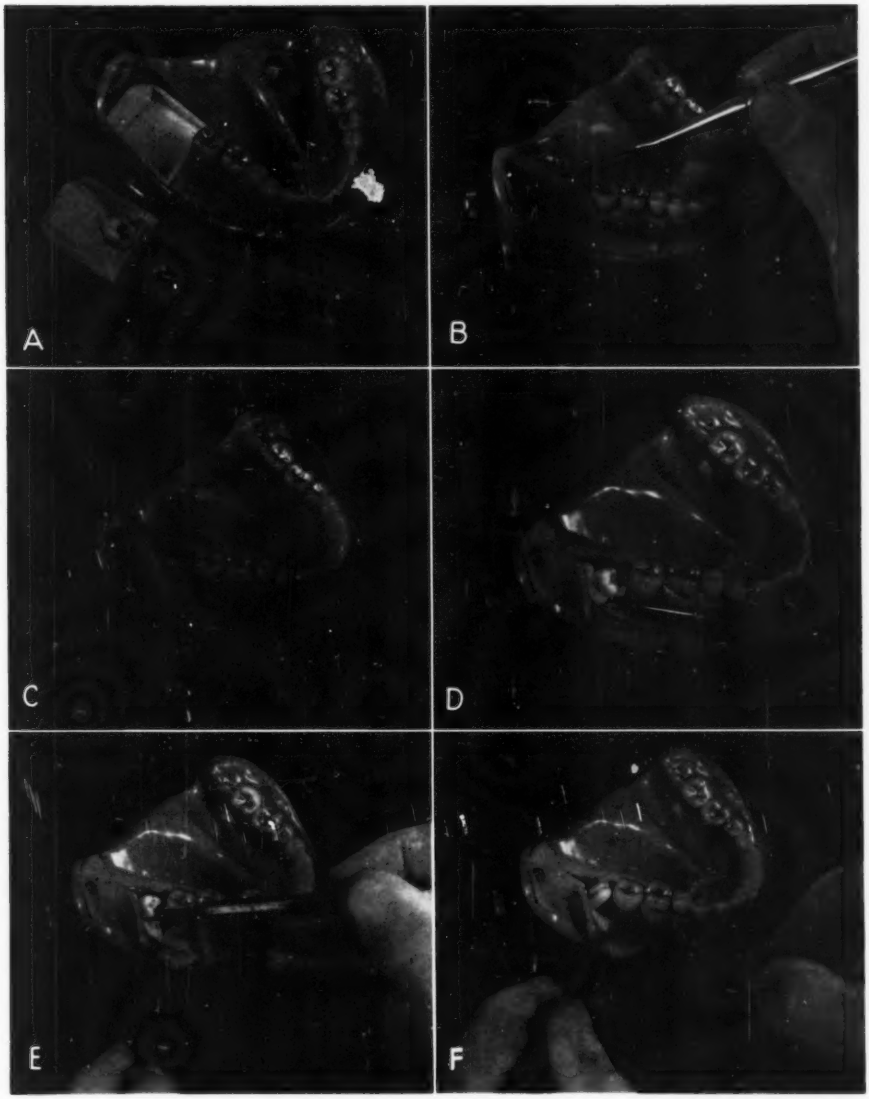
Commander (DC), U. S. Navy, Naval Gun Factory, Washington, D. C.

Commander (DC), U. S. Navy, U. S. Naval Dental School, Bethesda, Md.



Teaching model for demonstration of the removal of impacted third molars. A: Mucous membrane removed, and plastic cup in place. B: Incision made through vinyl resin cover. C: Vinyl resin retracted and tooth exposed. D: Tooth is removed. E: Tooth is sectioned. F: Correct use of elevator and forceps

model to hold the plastic cup in place (illustration, *A*).

The use of the training model includes two operations: the re-assembly of the tooth in the model, and the re-extraction of the tooth from the model.

After the tooth has been removed from the patient, it is re-assembled and placed in the plastic cup in the same position as it was in the mouth. It is surrounded in the plastic cup with a mixture of stone and vinyl resin, which resembles and simulates bone. After the stone has set, the block is placed in position underneath the vinyl resin mucous membrane, and the tooth is ready to be removed another time.

An incision is made through the vinyl resin cover (illustration, *B*), the vinyl resin is retracted and the tooth exposed (*C*). Incision and retraction are demonstrated at this time. The tooth is then removed, showing the removal of bone (illustration, *D*), the method of splitting the tooth, if necessary (*E*), and the use of elevators and forceps (*F*).

Any type or number of impactions can be used on the training model simply by changing the plastic block which holds the tooth. By working on the model, students can actually get the "feel" of cutting tissue and bone and of extracting the tooth. They gain experience and confidence before approaching the removal of a third molar from a patient. For a teacher, clinician or demonstrator, the model is a visual teaching aid which can be used to emphasize clearly and accurately the essential points during instruction.

Monostotic Paget's disease of the mandible

■ *Eli Olech, D.D.S., M.S., Chicago*

Osteitis deformans (osteitis hyperplastica[1]), or Paget's disease of bone, is a disease of the skeleton characterized by simultaneous resorption and excessive formation of bone of low differentiation resulting in enlargement and deformity of the bone or bones affected. The etiology is unknown.

This disease is most frequently observed in individuals after middle age (40 years) and may involve either one bone (monostotic type) or many bones (polyostotic type). Those most frequently affected are the sacrum and vertebrae, the femur, skull, sternum and pelvis. Bones which are under particular mechanical

Department of oral and maxillofacial surgery, University of Illinois College of Dentistry, Chicago.

1. Weinmann, J. P., and Sicher, H., *Bone and Bones*. St. Louis: The C. V. Mosby Company, 1947, p. 410-423.

stress seem to be involved most often. The disease does not spread from one bone to the other across an articulation.[2]

The jaws are involved in about 17 per cent of the cases of polyostotic Paget's disease.[3] In some cases the maxilla is the primary site of the disease. The roentgenographic findings depend entirely on the stage of the disease. In the early stage, roentgenograms of the jaws reveal osteoporosis and an absence of the lamina dura around the roots of the teeth in the involved zones. In the advanced stage sclerotic bone and hypercementosis of the roots of the teeth in the involved regions are observed.[3-5]

It is the purpose of this paper to report a case of monostotic Paget's disease of the mandible which has been followed for a number of years. A review of the literature revealed that only one case of monostotic mandibular Paget's disease has been reported.[9] The diagnosis in this case was made by microscopic examination of a biopsy specimen.

■ *Report of Case*

A white male, aged 63, came to the clinic first in January of 1948. Two weeks previously a lower left molar had been extracted with great difficulty. Postoperative pain and hemorrhage were severe and continued for 10 days. Both pain and bleeding were controlled by packing the socket. The patient had been referred to this clinic for further treatment.

HISTORY—In 1934 the patient noticed a slowly progressing, painless swelling in the lower left molar and bicuspid regions. A roentgenographic report in 1936 stated that there were several areas of radiolucency in the lower left molar and cuspid regions. In 1937, following extraction of a left mandibular molar, a postoperative infection arose which required incision and drainage. Healing occurred without any further difficulty. In 1938 the patient noticed an enlargement of the mandible in the right molar and bicuspid regions. At this time he also noticed that the mandible was becoming more prominent. Since the enlargement of the jaw caused him no pain he disregarded it, until, following extraction of another lower left molar, the acute pain, swelling and profuse bleeding occurred which brought him to this clinic.

EXAMINATION—There was a large, foul, crater-like cavity at the site of the recently extracted lower left second molar. The lower left first and third molars were missing. The remaining teeth were fairly firm and somewhat spaced. There was a hard, painless enlargement of the body of the mandible extending from cuspid to molar region on both sides. The patient's oral hygiene was extremely poor. Considerable mandibular prognathism was present. The maxilla was normal in size

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3. Stafne, E. C., Dental Roentgenologic Aspects of Systemic Disease. *J.A.D.A.* 40:265 (March) 1950.

4. Cahn, L. R., Paget's Disease of Bone. *Arch. Clin. Oral Path.* 1:141 (June) 1937.

5. Cahn, L. R., Bone Pathology as It Relates to Some Phases of Oral Surgery. *Oral Surg., Oral Med. & Oral Path.* 1:917 (Oct.) 1948.

6. Rushton, M. A., The Dental Tissues in Osteitis Deformans. *Guy's Hosp. Rep.* 88:163 (April) 1938.

7. Seldin, N. A., Paget's Disease—A Clinical Case. *D. Cosmos* 75:691 (July) 1933.

8. Thoma, K. H., Johnson, F. G., and Cascario, N., Jr., Paget's Disease Involving the Maxilla. *Am. J. Orthodont. (Oral Surg. Sect.)* 30:227 (April) 1944.

9. Thoma, K. H., Howe, H. D., and Wenig, M., Tumors of the Mouth and Jaws. *Am. J. Orthodont. (Oral Surg. Sect.)* 31:260 (April) 1945.

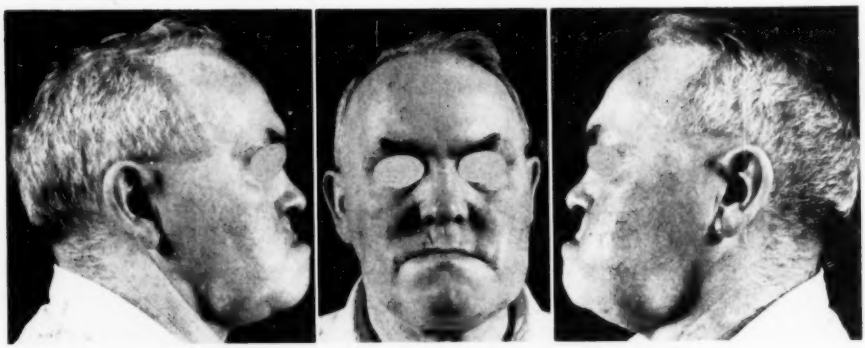


Fig. 1.—Photographs of the patient showed large, prominent, prognathic mandible, in contrast to the normal size of the maxilla and the rest of the head

and configuration with normal position of the teeth (Fig. 1).

Examination of the intraoral roentgenograms taken in 1936 showed some areas of radiolucency in the lower cuspid, bicuspid and molar regions, and hypercementoses involving the roots of the mandibular bicuspids and molars. The lamina dura around the roots of these teeth was absent in some areas and hazy in others. The maxilla was normal.

Roentgenograms taken from 1948 to 1951 showed an increase in the size of the hypercementoses involving the roots of the mandibular bicuspids and the remaining molar. The fuzzy, woolly appearance of the bone, the thickness of the jaw and the spacing of the teeth had increased greatly. The maxilla remained normal (Fig. 2). Roentgenographic examination of the entire skeleton revealed no pathologic changes in the other bones.

Chemical analysis of the blood serum disclosed the following: alkaline phosphatase (Bodansky), 10.3 units per hundred milliliters serum (normal 2 to 4); calcium, 9.7 mg. per hundred milliliters serum (normal 9 to 11); inorganic phosphorus, 3.6 mg. per hundred milliliters serum (normal 3 to 4).

Microscopic examination of tissue taken from the buccal aspect of the right mandible revealed an irregular network of bone trabeculae. In the section the areas occupied by bone tissue and bone marrow spaces were about equal. The bone tissue showed a large number of resting lines and reversal lines (mosaic structure), was partly of a mature, partly of an immature type. Most bone trabeculae showed, on one area, apposition of new bone, and, in other areas, resorption by large multinuclear osteoclasts (Fig. 3, *A*). The bone marrow was of the fibrous type. Macrophages could be seen frequently. The diagnosis was osteitis hyperplastica (Paget).

It was necessary to extract the left mandibular bicuspids several months later. The histologic examination of the specimen showed both tooth and bone. The bone adjacent to the apex was fused to

the root by a hypercementosis and exhibited a compact structure. Toward the periphery of the specimen, the bone formation was irregular and the cementing lines were prominent. The marrow spaces contained basophilic fibrinous

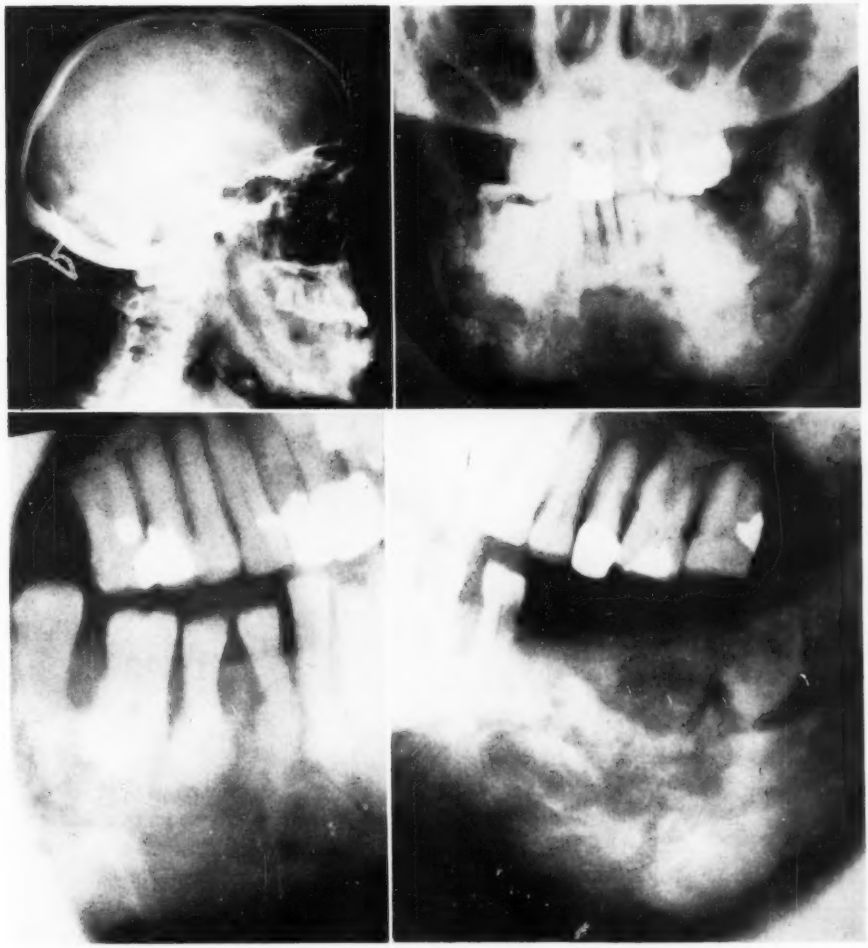
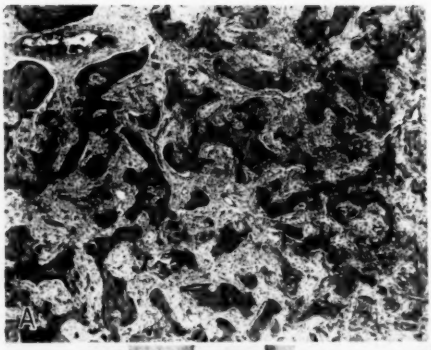


Fig. 2.—Above: Showing woolly, fuzzy appearance of the mandible, and normal appearance of the rest of the skull. Below: Right and left views of the mandible, showing abnormal spaces between the teeth, with large hypercementoses of the roots of the teeth in the involved zones. Note the woolly appearance of the bone



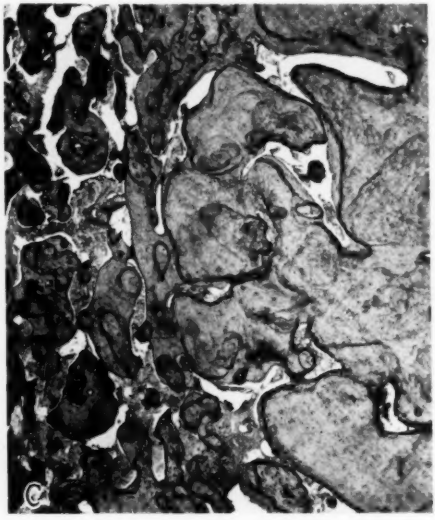


Fig. 3.—A: Biopsy specimen from right side of mandible. Note small bone trabeculae separated by fibrous marrow, the large number of osteoclasts in some areas and the occurrence of bone apposition in others. B: Showing hypercementosis involving root of extracted bicuspid and adjacent diseased bone. C: Higher magnification of junction between hyperplastic cementum and alveolar bone. Note the mosaic structure in the small bone trabeculae consisting of immature bone and connective tissue. Bone tissue and soft tissue between the trabeculae are necrotic

material. In one area there was a collection of lymphocytes and plasma cells and a strand of proliferating squamous type epithelium (Fig. 3, *B* and *C*). The diagnosis was Paget's disease with chronic inflammatory changes.

■ *Discussion*

The problem always arises when monostotic Paget's disease is seen, as to whether it is a distinct entity or just an early sign of the polyostotic disease. Usually the single bone lesions are found accidentally during roentgen examinations for irrevelant complaints or during examinations after injury. Deformities of the pelvis or long bones may be the chief complaint.

The lesion is never generalized but either polyostotic or monostotic from the

onset, and develops rather rapidly in any bone once it is involved. Monostotic Paget's disease is a distinct entity.[10]

While some authors feel that the diagnosis of osteitis deformans is essentially a roentgenologic problem, it is our belief that examination of a properly taken biopsy specimen is an invaluable diagnostic aid. Chemical analysis of the blood serum might also be diagnostically significant.

The serum phosphatase level is high in those conditions where bony matrix is being laid down in excess (for example, during growth, rickets, osteomalacia, hyperparathyroidism, osteitis deformans). The serum phosphatase level is found frequently to be higher in Paget's disease than in any other condition. In the absence of any other cause for a high phosphatase level, such as liver disease or obstructive jaundice, a high serum phosphatase level is probably indicative of increased osteoblastic activity.[11]

Paget's disease unquestionably predisposes to osteogenic sarcoma. Most osteogenic sarcomas arising after the age of 50 years are found in people with Paget's disease.[12] Therefore, it is important that an early diagnosis of osteitis deformans be made. In this way the patient can be observed carefully and frequently, and at the earliest sign of sarcomatous development, appropriate treatment can be instituted.

■ *Summary*

A rare case of monostotic hyperplastic osteitis (Paget) of the mandible of at least 17 years' duration has been described. The diagnosis was founded on the following observations:

1. The progressive painless enlargement of the mandible.
2. The typical woolly appearance of the bone in the roentgenogram.
3. The hypercementosis of the teeth in the involved areas.
4. The histologically characteristic picture.
5. The significantly increased blood level of alkaline phosphatase.

10. Groh, J. A., Mono-osteitic Paget's Disease as a Clinical Entity: Roentgenologic Observations in Nine Cases. *Am. J. Roentgenol.* 50:230 (Aug.) 1943.

11. Albright, F., and Reifenstein, E. C., Jr., *The Parathyroid Glands and Metabolic Bone Disease: Selected Studies*. Baltimore: The Williams & Wilkins Company, 1948.

12. Willis, R. A., *Pathology of Tumours*. St. Louis: The C. V. Mosby Company, 1948.

■ Valuable Result

The most valuable result of all education is the ability to make yourself do the thing you have to do, when it ought to be done, whether you like it or not.—*Huxley*.

Neurofibromatosis

■ *Franklyn S. Stillman, D.D.S., Schenectady, N. Y.*

The neurofibroma, or fibroma molluscum, is the most prevalent cutaneous tumor.[1] This benign tumor usually forms on a sessile base and is painless and slow growing.[2] It may vary from the size of a pinhead to the size of a lemon. It is a much more common oral tumor than would be judged from a review of the literature.

When multiple neurofibromas are present, the condition is termed neurofibromatosis or von Recklinghausen's disease (not to be confused with the parathyroid adenoma syndrome or neoplastic arthritis deformans, named after the same man). It is often accompanied by brown freckling and pigmentation, nevi, peculiar soft overgrowths of connective tissue and anatomic and functional disturbances of the central nervous system.[1, 2, 3]

The etiology and pathology of neurofibromatosis are neither clear cut, nor well understood. Both sexes are equally affected and both transmit the tendency as a dominant factor.[3-5] It is known that in families where the condition is prevalent, one member may develop tumors and the only apparent effect on another may be pigmentation.[1, 4]

Since the parent tissue is the connective tissue coat of nerve fibers and the Schwann cells of nerve sheaths of peripheral motor, sensory and sympathetic systems, it is readily understood that the tumor can arise anywhere in the body.[6] It affects the skin, mucous membrane, subcutaneous tissues, viscera, deep nerve trunks, bones and endocrine glands.[1, 4] The associated anomalies need further study. The hirsutism and macroglossia are reminiscent of an endocrine disturbance.[2, 7] Whether it is cause or effect is uncertain.

The tumors are sparsely encapsulated and in most cases diffuse and infiltrating.[4, 5] Owing to the manner in which the multiple lesions of neurofibromatosis involve the surrounding tissues, it is not advisable to attempt removal except in selected lesions, where the tumor is subjected to repeated irritation, or for cosmetic reasons. It is practically impossible to excise them completely without including a wide deep margin of normal tissue. Often a wide excision is not possible without destruction of vital or strategic structures.[1, 3] They often recur despite the greatest precautions, and attempts at excision sometimes have been followed by

1. Ewing, James, *Neoplastic Diseases*, ed. 4. Philadelphia: W. B. Saunders Company, 1940, p. 159-163.

2. Sutton, R. L., and Sutton, R. L., Jr., *Diseases of the Skin*, ed. 9. St. Louis: The C. V. Mosby Company, 1935, p. 735-744.

3. Ward, G. E., and Hendrick, J. W., *Diagnosis and Treatment of Tumors of the Head and Neck*. Baltimore: Williams & Wilkins, 1950, p. 105-108.

4. Boyd, W., *A Text-Book of Pathology*, ed. 4. Philadelphia: Lea & Febiger, 1943, p. 905-908.

5. Thoma, K. H., *Oral Pathology*, ed. 3. St. Louis: The C. V. Mosby Company, 1950, p. 1394-1397, 1469-1472.

6. Bernier, J. L., and Ash, J. E., *Atlas of Dental and Oral Pathology*, ed. 4. Washington, D. C.: Registry Press, 1948, p. 159.

7. Prinz, H., and Greenbaum, S., *Diseases of the Mouth and Their Treatment*, ed. 2. Philadelphia: Lea & Febiger, 1939, p. 446-447.

recurrence of a neurosarcoma of a low grade of malignancy.[1, 4, 6] Approximately 8 per cent of recurrences are malignant.[3] Radiation therapy is not successful in the treatment of neurofibroma.[3]

Three cases of neurofibromatosis are presented here, each one demonstrating a different manifestation of the disease.

■ *Case 1: Lesions of the Oral Mucosa*

A 28 year old white woman was referred for surgical correction of the alveolar process and alveolar mucosa. She could no longer wear her partial upper denture because of soft tissue growth. The patient presented an oral surgeon's report of removal of an odontoma from the right maxilla and of removal of a fibroma from the right mandible (1948). The medical history was noncontributory. The patient was married and the mother of an apparently normal 5 year old boy.

On clinical examination an endocrine disturbance was considered. The patient had a mild degree of hirsutism and macroglossia, with large flabby lips. Her skin was freckled and she had a large growth on the left side of her face and neck (Fig. 1, *A*). An attempt at excision had been made years previously. This lesion was identified as a pigmented verrucous nevus, which is consistent with this syndrome.[3] There were two subcutaneous nodules in the scalp. Oral examination (Fig. 1, *B*) revealed a large, firm tumor mass posterior to the hard palate. It arose on a sessile base from the junction of the alveolar and palatal processes on the right and extended completely across the palate. The soft tissue over the right maxillary tuberosity was one-half inch in depth from crest to bone. It was freely movable and of normal color. The mucoperiosteum was greatly thickened all over the mouth. The upper jaw contained six loose teeth. The buccal parietes (Fig. 1, *C*) contained multiple soft elevations, which resembled the papilla of the orifice of Stensen's duct. This gave the cheek the appearance of peaks in a mountain range. These sessile based elevations could be held out to 1 cm. but would collapse as soon as released. The patient stated that occasionally she would bite them. She blamed all the areas on cheek biting, but admitted having the slow growing palatal mass "for years." The reason she was now seeking relief was because of displacement of her partial denture by the palatal mass.

The roentgenograms were not diagnostic. Some edentulous areas showed slight osteosclerosis, whereas most of the trabecular structure showed slight hypocalcification. The pulp canals, cementum formation and the lamina dura were normal. The thickness of the mucoperiosteum on the upper right molar region was approximately one-half inch. The irregularity of bone detail was due to the previous operation which had been performed in the region.

Biopsy was done on the palatal growth. It was reduced to the normal contour of the palate, leaving a raw surface. No attempt was made to excise all tumor tissue at this time. One of the papillae on the right cheek was removed to its base. The tissue from the palate was diagnosed as neurofibromatous type of change in the corium, suggesting von Recklinghausen's disease. The tissue from the cheek was diagnosed as neuroma of the von Recklinghausen's disease type.

TREATMENT—Removal of all tumor was out of the question for two reasons:

1. The extent of the tumor could only be determined microscopically. Clinically, there was no demarcation of normal from tumor tissue.

2. Removal of all tumor would involve removal of the entire thickness of mucoperiosteum, wherever there was involvement, and removal of most of the buccal mucosa and submucosa.

There was a serious question to ask before proceeding. If a simple surgical correction of the mouth was done, would recurrent growth of tissue destroy the usefulness of the patient's new dentures? The problem is not covered in the literature. Evidently something had to be done. The chance that continued growth would proceed slowly or not at all was taken, in order to give the patient a functioning masticatory apparatus.

The decision was made to extract the upper teeth and do conservative removal of bone and soft tissue so that an upper denture could be constructed. In the lower jaw, the left bicuspids and first molar were to be extracted and their supporting bone reduced, in order to increase the intermaxillary space. The soft tissues

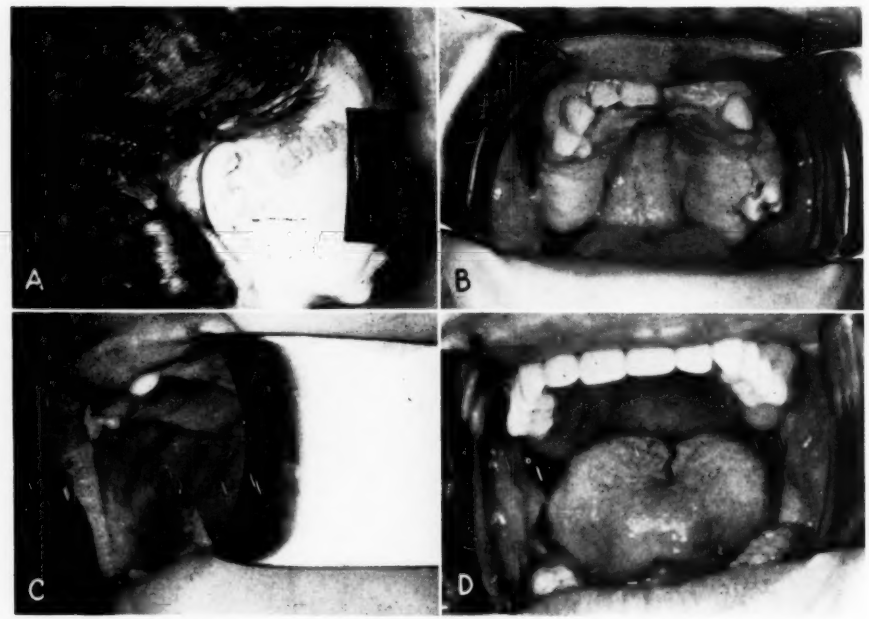


Fig. 1.—(Case 1) A: Profile view, showing pigmented verrucous nevus. B: Palatal growth on right. View taken after biopsy. Note bulky ridges, which are composed mostly of soft tissue. C: Multiple elevations of neurofibromas in cheek. D: Full upper and partial lower dentures in place three months postoperatively

covering the posterior edentulous mandibular ridges would be undermined and reduced to increase the intermaxillary space and prepare the lower ridge for a partial denture. The patient had not noticed any growth of the lower mucosa. The cheek would be left alone. Special care would be taken in the placement of teeth to eliminate cheek-biting.

On December 1, 1950, under infiltration anesthesia with 2 per cent lidocaine and epinephrine 1:50,000, all upper teeth were extracted. The mucoperiosteum was undermined and reduced to normal thickness. Bone was removed where necessary. The tissues were approximated under tension with 22 deep 000 silk sutures. Four rubber dam drains were inserted. The drains were removed on the second postoperative day and the sutures on the seventh day. Healing was uneventful.

On December 30, 1950, the lower left bicuspids and first molar were extracted and lower alveolectomy was done. The mucoperiosteum was again reduced in thickness where necessary. The wounds healed uneventfully and in normal time.

PATHOLOGIST'S REPORT—Examination of the soft tissue revealed stratified squamous epithelium and subjacent dense tissue resembling keloid. [The peculiar overgrowths of connective tissue are a condition which may accompany neurofibromatosis.] Small amounts of neurogenic tissue were identified. Examination of the bone revealed fibrosis of marrow. No diagnostic changes.

A set of dentures was constructed and the patient has been wearing them comfortably (Fig. 1, *D*). There have been no further changes to date.

Fig. 2.—(Case 2) Radiolucent area in the right maxilla has the appearance of a residual cyst which has broken through the cortex

This case was peculiar because any decision which was made would be open to debate. There was no standard manner of treatment. The chance of continued growth had to be taken. To my knowledge, this particular problem has not been covered in the literature and offered a difficult decision to make.

■ *Case 2: Solitary Neurofibroma of Bone*

A 42 year old white man, with coronary sclerosis, was referred for removal of a cyst from an edentulous maxilla. The patient had been experiencing pain for one year because his denture was pressing on the swelling. The denture had been adjusted several times. A roentgenogram showed what appeared to be a residual cyst below the antrum on the left (Fig. 2).

Oral examination revealed a nonfluctuant mass extending into the vestibule in the left maxillary bicuspid region. There was slight surface ulceration from denture irritation. The color and texture of the remaining mucous membrane was normal.

On July 24, 1950, under 2 per cent procaine and epinephrine 1:50,000 anesthesia a flap was laid back and the mass enucleated from the maxilla. It shelled out of the bony cavity freely. The bony surface was smooth. The mass had to be dissected free of the covering mucoperiosteum. It was cut and found to be solid, so the cavity was cauterized chemically. The tumor measured 10 by 10 by 9 mm. and appeared to be encapsulated. The wound was allowed to heal by third intention and closed completely in four weeks.

The pathologist's report was neurofibroma.

Upon receipt of the pathologist's report the patient's skin was examined more thoroughly, and a number of small tabs were found on his back. They proved to be molluscum fibrosum. There was no familial history of the disease.

In the past year there has been no recurrence. The patient is wearing his denture comfortably. There have been no further skin changes. I feel that this tumor arose from nervous elements in the bone and broke through the cortex. It is possible that it arose from the periosteum and caused a cavity because of the confining influence of the denture.

Fig. 3.—Case 3: Multiple cutaneous tumors in the classical neurofibromatosis.

■ *Case 3: Classical von Recklinghausen's Disease*

This case is presented to demonstrate the usual dermatologic manifestations of neurofibromatosis. The patient was seen in a dermatology clinic where he was examined and photographed (Fig. 3). He was a 42 year old negro man in excellent health. As long as he could remember he had multiple, sessile growths on his entire body. Some were as large as a lemon. Neurofibroma had been proved repeatedly by biopsy. The patient learned to live with his growths and experienced discomfort only where there was friction. Occasional excisions were followed by slow recurrence. Considering the number of growths on his face and neck, it was amazing to note that he was clean shaven and not nicked from his razor.

Oral examination revealed a few tabs on the buccal parietes and a small sessile growth on the lateral border of the tongue. He would occasionally bite the buccal growths but did not want to have them removed.

■ *Summary*

In the three cases presented the main similarity was that growths from different areas have been microscopically similar. These growths usually invade surrounding tissues in a diffuse manner and consequently are difficult to remove completely. They often recur or continue to grow. Case 1 presented many of the anomalies often associated with von Reckling-

hausen's disease. It also presented the problem of knowingly doing an incomplete removal of tumor to satisfy a prosthetic restoration, which possibly might be put out of function by recurrence of the tumor.

Case 2 is one which might not have been recognized for years, had the tumor been in the viscera. This case shows only mild manifestations of the disease. It does not bear much of a resemblance to case 1 and there is some doubt if it really is the same disease.

Case 3 showed the usual dermatologic manifestations of neurofibromatosis, but presented no clinical evidence of the associated anomalies. The patient did have oral lesions of neurofibromatosis.

■ *Conclusions*

It is difficult to define neurofibromatosis. One solitary neurofibroma does not mean von Recklinghausen's disease. Perhaps five separate tumors do not have a common basis for occurrence. It is difficult to diagnose von Recklinghausen's disease where only a few growths are present.

The multiple growths are definitely systemic in origin. The associated anomalies are all due to changes in function of nervous tissue. Some suspicion should be cast in the direction of endocrine disbalance.[2] There is a great need for more research and literature on this perplexing disease.—*713 Union Street.*

■ Authors and Editors

The author's job is to convey something from himself to his reader so well that the message conveyed will be gladly received and recognized for what it is. This is not a simple task; and it is not true that any set of words will do it, for there are no indifferent words. Every word of an article does good or ill; sections, paragraphs, sentences, phrases, words, or even parts of a word are evil if they can be done without. They make an article longer than it need be and the potential reader may decide that it is too long to attempt; they raise issues not connected with the main theme and so lessen the reader's enthusiasm and concentration; they irritate the fastidious and critical, the very people whose judgment and comments the author should particularly wish to enlist; and, worst of all, they may obscure the meaning. Editors who shorten articles often plead lack of space, but their real justification is the harm done by everything that can be done without.—*J. W. Howie, M.D., "On Writing to Be Read," Lancet 261:320, August 25, 1951.*

Late radiation necrosis of the jaw bones

■ *Thomas J. Cook, D.D.S., Miami, Fla.*

Irradiation osteonecrosis is a complication encountered in the dental system following radiation therapy for cancer in and about the oral cavity. According to Kirsh and others,[1] there is no essential difference between the reaction caused by roentgen rays and those effected by radium.

Hunt and Breit[2] report, "The primary essential in the treatment of cancer is the complete eradication of the malignant neoplasm. The other important consideration is maintenance of subsequent disability, distress, and deformity at a minimum. The radiotherapist must frequently chart a precarious course for his patient. On the one hand lies the abyss of oblivion in cancer, while on the other is the devil of post-irradiation sequelae. . . ."

In a series of 1,819 patients with intraoral cancer treated at Memorial Hospital, New York, 235 patients developed irradiation osteonecrosis.[3]

Attention to the pathologic effects of irradiation of bone was directed by Ewing[4] in 1926. He ascribed the effect of irradiation on bone to interference with its nutrition which is a result of obliteration of the vascular supply from the periosteum, the nutrient artery, capsular arteries and the bone marrow, and to secondary irradiation due to high calcium content.

Ivy[5] states that "Irradiation treatment of malignancy of the mucosa of the mouth and adjacent structures, is frequently followed by necrosis of the bone and healthy soft tissues around the lesion. After a long waiting period, separation of the soft tissue slough and bony sequestrum takes place, with the result that an opening is left through the cheek into the floor of the mouth, the nose or the maxillary sinus, depending on the location of the original site of the lesion treated. . . ."

Gardham[6] pointed out that the damage caused to normal tissue by irradiation is difficult to assess, but evidence is rapidly accumulating that it is largely a question of liability to subsequent necrosis.

Del Regato[7] states, "The use of current methods of roentgen therapy with 200 kilovolts in the treatment of cancer of the buccal cavity, pharynx and larynx gives rise to dental lesions ending in the destruction of the teeth, and infection of the alveolar cavities and, at times, leading to a necrosis of the maxilla or mandible

1. Kirsh, D., Mahoney, J. F., and Pendergrass, E. P., The Use of Radon Ointment in the Treatment of Late Irradiation Ulcers. *Am. J. M. Sc.* **212**:395 (Oct.) 1946.

2. Hunt, H. B., and Breit, D. H., Radiotherapeutic Eradication of Cancer With Surgical Repair of Subsequent Ulceration and Deformity. *Am. J. Roentgenol.* **59**:229 (Feb.) 1948.

3. Watson, W. L., and Scarborough, J. E., Osteoradionecrosis in Intraoral Cancer. *Am. J. Roentgenol.* **40**:524 (Oct.) 1938.

4. Ewing, J., Tissue Reactions to Radiation. *Am. J. Roentgenol.* **15**:93 (Feb.) 1926.

5. Ivy, Robert H., Repair of Full Thickness Cheek Defects Following Irridiation Necrosis. *Plast. & Reconstruct. Surg.* **4**:188 (March) 1949.

6. Gardham, A. J., The Classification of Buccal Neoplasms in Relation to Treatment and Prognosis. *Lancet* **1**:677 (March) 1939.

7. del Regato, J. A., Dental Lesions Observed After Roentgen Therapy in Cancer of the Buccal Cavity, Pharynx and Larynx. *Am. J. Roentgenol.* **42**:404 (Sept.) 1939.

which sometimes endangers the life of the patient even though the neoplasm has disappeared."

■ *Causative Factors*

Kanthak[8] states that there are "three definite factors which seem to be conducive to osteoradionecrosis: Irradiation, infection, and trauma. Irradiation of osseous tissue tends not only to destroy the normal resistance of the tissue to infection and its response to healing, but also to alter the entire process of healing. Infection is induced by poor oral hygiene, general lack of care of the mouth and the retention of carious or broken-down teeth. Trauma is usually added to this burden by the simple extraction of a tooth. After extraction, the socket shows no tendency to heal and the adjacent soft tissues seem to melt away, leaving a large portion of the bone exposed to the mouth and denuded of all soft tissue covering." He presented two cases which effectively demonstrate extensive suppuration and loss of bone.

McIndoe and associates[9] stated, "In the roentgenogram there may be areas with a relative increase in density which may be confused with oestoplastic metastasis, or there may be areas of absorption of bone which may resemble osteolytic secondary processes. With secondary infection, such as occurs in the mandible, there is marked decalcification and absorption of bone which may be impossible to distinguish from invasion of the bone by recurrence of the neoplasm."

Gratzek, Holstrom, and Rigler[10] describe postirradiation bone changes as "frank aseptic necrosis."

Watson and Scarborough[3] state that "the periosteum is highly susceptible to irradiation. After sizable therapeutic doses, gross swelling and thickening occur and the periosteum strips easily from the bone."

Windeyer[9] established two distinct entities in radionecrosis: "early or acute necrosis" and "late necrosis." He indicated that particular attention should be given to radionecrosis of cartilage and bone because of (1) the latency of occurrence, (2) the likelihood of occurrence when certain sites are irradiated and (3) the prolonged suffering and pain when it occurs. Heavy irradiation of bone causes changes which are permanent and not always apparent. When bone is compared with soft tissue, bone is known to absorb more irradiation owing to its greater content of the heavier elements. The blood supply to the irradiated bone then becomes restricted, owing to endarteritis, thus rendering it incapable of responding to an inflammatory reaction. He also related that when lesions in and about the mouth are irradiated, the mandible and the maxilla may receive heavy doses. These bones may remain normal for years until they are traumatized or become secondarily infected, as might happen when an infected tooth is removed or when an intrabuccal ulceration is present. It was affirmed that necrosis is associated with pain and edema. Sequestration is slow and consequently it may take years to accomplish.

8. Kanthak, F. F., X-ray Irradiation and Osteonecrosis of the Jaws. *J.A.D.A.* **28**:1925 (Dec.) 1941.

9. McIndoe, A. H., Forbes, Robert, and Windeyer, B. W., Symposium: Radiation Necrosis. *Brit. J. Radiol.* **20**:269 (July) 1947.

10. Gratzek, F. R., Holstrom, E. G., and Rigler, Leo, Post-irradiation Bone Changes. *Am. J. Roentgenol.* **53**:62 (Jan.) 1945.

■ *Prophylaxis*

As a prophylaxis Watson and Scarborough[3] advise removal of nonvital, loose, carious teeth before treatment is started. In certain instances sound teeth in the immediate vicinity of the neoplasm should be removed, because after a period such teeth may disintegrate owing to lack of adequate blood supply.

Del Regato[7] reports that after irradiation there may be a superficial caries of the neck of the tooth which progresses until it extends around the tooth and eventually causes amputation at the gum line. These lesions may end in necrosis and infection about the residual roots. He advocates as a precaution that all infected teeth be removed and those teeth within the region which is to receive intense radiation. The gums should be completely healed before treatment is started.

Martin and Wright[11] state that "it is highly desirable that all teeth situated adjacent to the treatment zone be removed and the gums be healed before irradiation therapy is started."

Dell[12] feels that "if the mandible or maxilla is to be heavily irradiated the teeth should be extracted." He further states, "Why do some patients refuse to have their teeth extracted? Because the radiologist has not been able to sell them the idea without quite definite and positive help from the dentist."

Daland[13] feels that "whenever deep x-ray therapy is to be directed to lesions of the mouth, any teeth through which the beam will pass should be removed before treatment is started. Treatment is deferred for one week after the extraction. Once treatment has been given, none of the teeth exposed to irradiation should be extracted for a period of several years."

■ *Treatment*

Kanthak[5] waits for a line of separation of the dead bone to become apparent on roentgenographic examination and then does a sequestrectomy; the usual period of waiting is about six months. Watson and Scarborough[3] also use a conservative method of treatment. General supportive measures are employed to increase general resistance which is followed by sequestrectomy when indicated. Thoma[14] feels that conservative treatment is indicated.

Daland[13] favors electrocoagulation. He feels that the exposed bone will not form spontaneous sequestrum, or will never cover with periosteum or mucosa, and when treated by electrocoagulation will die and separate as a heat sequestrum, with some chance that the deeper bone will cover over.

Edgerton, Ward and Sikes[15] resect the lower jaw for necrosis due to irradiation. Ward[16] writes, "If the mandible becomes exposed then radioosteonecrosis is surely present and anything short of resection is simply prolonging the patient's discomfort."

In this series of 11 cases 4 developed

11. Martin, C. L., and Wright, C., Treatment of Cancer of the Face, Mouth and Neck With Irradiation. *J.A.M.A.* 134:861 (July 5) 1947.

12. Dell, J. M., Jr., Mutual Problems of Dentist, Physician and Roentgenologist. *J. Florida D. Soc.* 18:10 (April) 1947.

13. Daland, E. M., Radiation Necrosis of the Jaw. *Radiology* 52:205 (Feb.) 1949.

14. Thoma, K. H., *Oral Pathology*, ed. 2. St. Louis: The C. V. Mosby Co., 1944.

15. Edgerton, M. T., Jr., Ward, G. E., and Sikes, T. E., Fixation and Plastic Repair After Partial Mandibular Resection. *Plast. & Reconstruct. Surg.* 5:231 (March) 1950.

16. Ward, G. E., Personal Communication, 1950.

irradiation osteonecrosis after the removal of teeth, 3 after dentures were inserted over irradiated areas, 2 developed demineralization of the teeth at the cementoenamel junction. For 2 patients with proved cancer of the floor of mouth, radiation therapy had been started, but complications developed which required that the treatments be stopped.

■ *Case 1*

A male, aged 52, was seen in the Tumor Clinic at Jackson Memorial Hospital, on September 26, 1947. His chief complaint was difficulty in opening his mouth and swallowing.

PREVIOUS HISTORY—On June 26, 1944, the patient had been seen and treated in a clinic elsewhere. The following report was received from the clinic:

> The patient was found to have an extensive epithelioma of the left root of the tongue extending from a point opposite the anterior pillar down almost to the level of the tip of the epiglottis. He had a large metastatic node in the left upper cervical region.
>
> We gave treatment by means of radium seeds inserted into the primary lesion; also into the metastatic mass in the neck. In addition external roentgen irradiation was given. Twenty radium seeds, having an average value 1.2 millicurie each, were inserted into the metastatic lesion and twelve seeds of the same value were implanted into the primary lesion.

CLINICAL FINDINGS—Because of trismus the mouth could not be opened wide for adequate examination; however, no abnormalities of the base of tongue could be detected with the use of a laryngeal mirror.

ROENTGEN EXAMINATION—Both mandibles were negative. Multiple opaque densities, resembling radon seeds were noted in the soft tissues of the left side of the neck adjacent to the mandible (Fig. 1).

Fig. 1.—Case 1. Multiple opaque densities resembling radon seeds are noted in the soft tissues of the left side of the neck adjacent to the mandible. The mandible was negative.

TREATMENT—An exerciser was made which could be inserted between the anterior teeth and the patient was encouraged to use it daily. It was hoped that the appliance would prevent the advance of trismus and indirectly aid in mastication. On October 10, the patient stated that the exerciser had helped him. The oral tissues appeared clear and the patient's chief complaint was in swallowing.

On January 1, 1948, the patient complained of pain in the only molar tooth (the second molar) in the left mandible. The tooth was painful to percussion and when it came in contact with the opposing molar tooth of the maxilla. Roentgenographic examination disclosed involvement of the bone at the bifurcation of the roots (Fig. 2, *A*). Palliative treatment was given and the patient advised against having the tooth removed.

COURSE—When examined on April 20, the patient stated that a month previously the tooth became so painful that he had it removed elsewhere.

The wound failed to heal, the alveolar process was exposed, the tooth sockets were clearly visible and extremely painful. The region was irrigated with saline solution and the exposed bone covered with an anesthetic paste. Roentgenographic examination demonstrated slight erosion of the alveolar process in the region where the tooth was removed (Fig. 2, *B*).

That which happened as time went on in this particular case has demonstrated just what can occur when a single tooth is removed from a patient who has been given roentgen therapy for cancer of the oral cavity if that tooth was within the region irradiated. The story is best told with a series of reproductions of roentgenograms which were taken periodically (Fig. 2).

The patient died on December 22, 1950, with bronchopneumonia due to metastasis to the lungs of carcinoma.

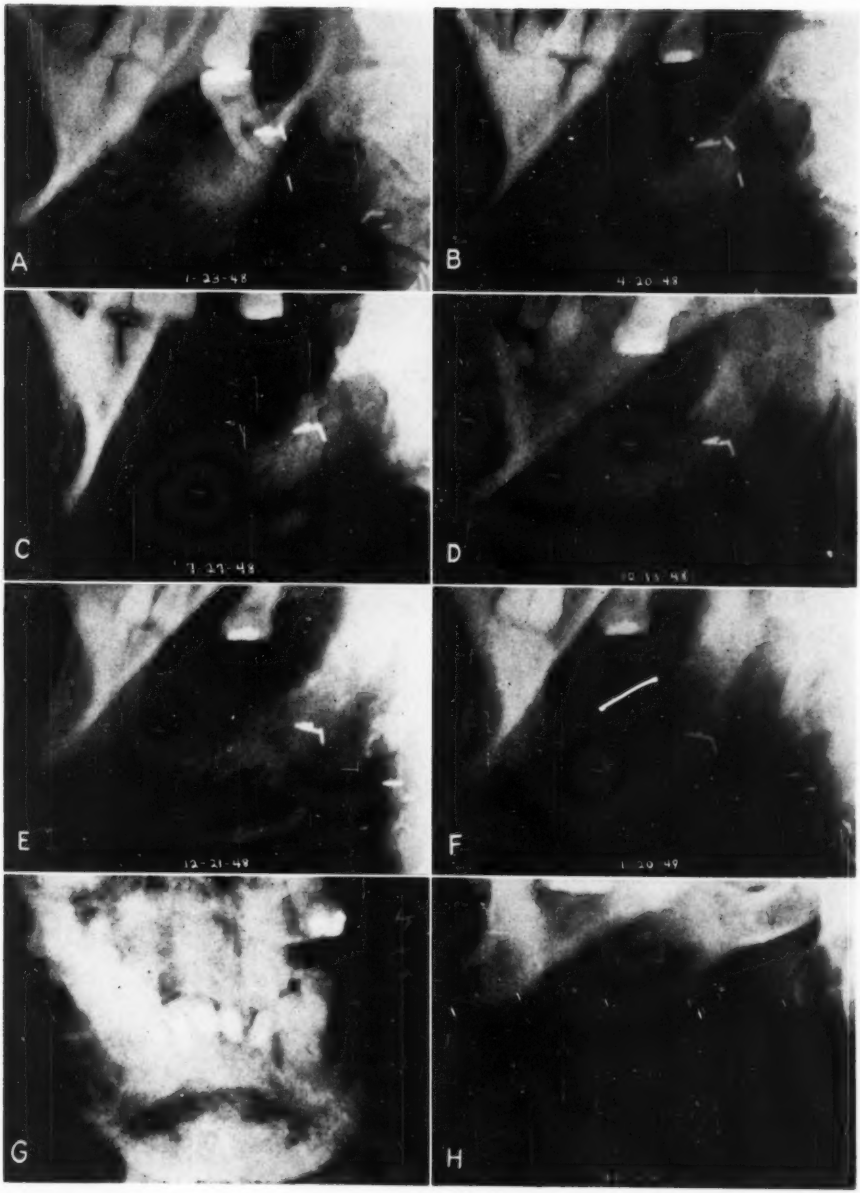
COMMENT—During the period that this patient was under observation, he was hospitalized frequently; he was given adequate chemotherapy and medication for relief of pain, which at times was intense.

■ *Case 2*

A male, aged 49, was first seen in consultation on December 1, 1948. He was referred by a roentgenologist for the removal of teeth prior to roentgen therapy for a lesion in the floor of the mouth that had been biopsied and reported as squamous cell carcinoma, grade I.

EXAMINATION—There was a full complement of teeth in the mandible, with the exception of the first molar tooth

Fig. 2.—(Opposite page) Case 1. A: Resorption of the bone in the bifurcation of the roots of the remaining molar tooth on the left side. B: One month after the removal of the molar tooth. The tooth socket and also erosion of the superior alveolar ridge are shown. C: Four months after extraction, the roentgenogram demonstrates extension of the irradiation osteonecrosis to the body of the mandible. D: Seven months after extraction there appears to be sequestration in the anterior portion and further extension to the ascending ramus. E: Pathologic fracture. F: Sequestration of the anterior portion of the fractured mandible after ten months. G, H: Roentgenograms made thirty months after the onset of the irradiation osteonecrosis and just prior to the patient's death demonstrate loss of the body of the mandible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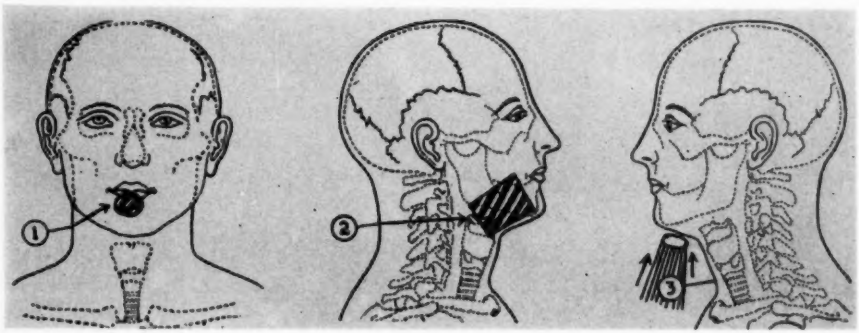


Fig. 3.—Case 2. Radiation field chart indicating treatment given from November 29, 1948, to January 18, 1949. Field 1: Intraoral cone, 4 cm. round, 4,700 r. Field 2: Extraoral cone, 6 by 8 cm., 2,400 r. Field 3: Extraoral cone, 7 cm. round, inframental, 2,400 r. All radiation at 200 kilovolts

on the left side. On the floor of the mouth, to the right, there was a lesion which presented some vegetative type of growth which measured about 3 by 2.5 cm.

TREATMENT—The roentgenologist decided that in order to reach the tumor with an intraoral cone, it would be necessary to remove the anterior teeth in the mandible. The teeth were removed, the alveolar process prepared and the mucosa approximated with sutures. On the fifth day the sutures were removed, the wound was healing and the mouth was clear. On the tenth day the wounds of extraction were completely healed and the patient referred back to the roentgenologist.

The treatment given is shown in Figure 3.

The roentgenologist reported on March 19, 1949, "There was a marked mucosal reaction in the floor of the mouth at the completion of treatment. Today the mucosa appears clean and there is no evidence of residual disease or remaining reaction."

On July 1, the patient was admitted to Jackson Memorial Hospital with the diagnosis of irradiation necrosis of the mandible.

The patient stated that he had been well and returned to his work. Several weeks previously "he had pain in a tooth on the lower right side, went to a dentist and had it removed." He further added, "the gum didn't heal so I had the next tooth removed by another dentist." When asked if he told the dentist that he had roentgen treatments he said, "No, I told him I had cancer, but that was cured."

There was exposure of the mandible extending from the midline posterior to the angle (Fig. 4, *A*). The mucous membrane was completely absent over the alveolar ridge and could be deflected to the inferior border with ease.

All of the exposed bone was thoroughly coagulated and electrodesiccated. The remaining mucous membrane edges were elevated and the electrodesiccation carried beyond the point of exposure. This procedure was carried out in accord-

ance with the recommendation in a publication by Daland.[13]

On September 6, 1949, the patient was readmitted to Jackson Memorial Hospital because of a necrotic mass which extended extraorally. He was in intense pain, and weak from lack of nourishment.

Roentgenographic examination demonstrated destruction of the body of the mandible (Fig. 4, *B*).

A large sequestrum was removed (Fig. 4, *C*) and the patient then felt some relief. There was a large opening in the submandibular region through which the tongue could be seen (Fig. 4, *D*).

The patient was admitted to the hospital several times, and plastic repair was planned. However, he left the city and a check through Social Service established the fact that the patient died in February, 1951.

COMMENT—This patient was apparently doing well until the teeth were removed; from that date until his death there was great suffering.

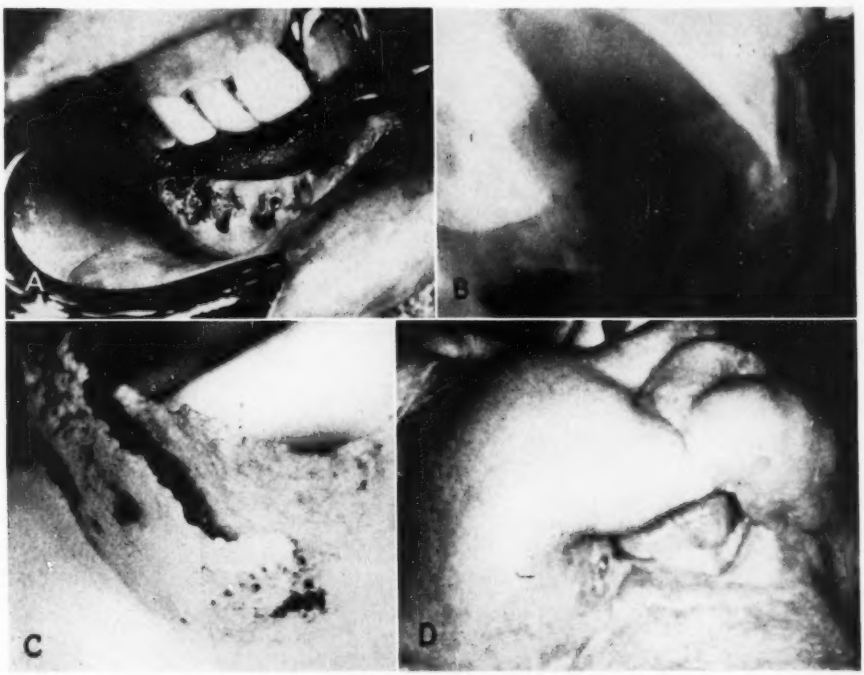


Fig. 4.—Case 2. A: Denuded mandible showing the tooth sockets following removal of teeth in a patient who was treated with roentgen ray for carcinoma of the mouth. B: Destruction of the body of the right mandible by irradiation osteonecrosis. C: Necrotic bone sequestrated from right mandible. D: Extraoral opening following sequestrectomy

■ *Case 3*

A male, aged 56, was seen in consultation on May 13, 1949. His chief complaint was pain in the anterior portion of the mandible where teeth had been removed one month previously.

PREVIOUS HISTORY—The patient was a salesman who did considerable traveling; he was intelligent and cooperative. He stated that a year previously (1948) he had a tumor under his tongue that was diagnosed as cancer. Roentgen treatment was given in another city over a period of a month, and the results were good. An attempt was made to get an accurate account of the treatments, but in response to several letters it was stated that "approximately 5,000 r were given intraorally and extraorally"; no other details were given.

The patient's dentist was most cooperative and sent roentgenograms which were taken previous to the extractions (Fig. 5, *A*).

FINDINGS—There was denuded mandible in the incisor-cuspid region of the mandible (Fig. 5, *B*). It was firmly attached and the tooth sockets clearly visible. There was a board-like swelling in the submandibular region.

No treatment was given other than sedation, since the patient decided to return to his home after the nature of the treatment and the time it would take was explained to him. Two months later (July 15) a letter was received stating that he was suffering great pain and had decided "to enter a hospital for the removal of his jaw." An x-ray film was enclosed which demonstrated extreme destruction of the mandible (Fig. 5, *C*). The patient was not heard from again.

COMMENT—When asked why the teeth were removed, the patient stated that they were painful and loose. He had anticipated having restorations made just as soon as the gums healed. When asked if he told the dentist who removed the teeth that he had roentgen treatments, he said, "Yes."

■ *Case 4*

A man, aged 68, was referred to my office on October 26, 1949; his chief complaint was pain in the left mandible.

PREVIOUS HISTORY—Three months previously the patient was treated for cancer of the gum with radium, and the result of the treatment was considered satisfactory. He stated that he held an appliance in his mouth for several hours and that he did get a "severe burn" but after a few weeks it all cleared up and he decided to drive to Miami to visit his son. Before leaving home he had the mandibular left cuspid tooth removed (he wore a full upper denture), and was planning to get upper and lower dentures when he returned.

FINDINGS—The mandibular left cuspid tooth had been recently removed and there was exposed bone on the left side. The socket was visible, and the surrounding mucosa was inflamed.

Roentgenographic examination revealed recent extraction from the mandibular left cuspid region (Fig. 6, *A*).

Temporary relief was administered,

the patient's son was contacted and advised that his father should return home and immediately contact the physician who treated him with radium. It was believed that he had an irradiation osteonecrosis. The son decided the patient was to stay with him for the winter, so the treatment was given here.

Report of previous treatment was obtained which read: "There was a lesion in the left side of the mandible; the area was ulcerated and there was some redundant granulation tissue surrounding the ulceration. A biopsy was done and reported as spinocellular carcinoma, grade II. A radium mold was designed to fit over the left mandible and treatment given. The distribution of the radium was considered satisfactory. There was a small excoriation on the mandible; the result of the therapy satisfactory."

TREATMENT—Oral hygiene was instituted and zinc peroxide suspension used daily in irrigation of the wound. During the following week there developed infiltration of the skin and induration in the submandibular region. Penicillin was administered intramuscularly, 600,000 units, for the first two days and then 300,000 units daily. Drainage was established in the submandibular region; through and through irrigations of zinc peroxide were started. Eventually a por-

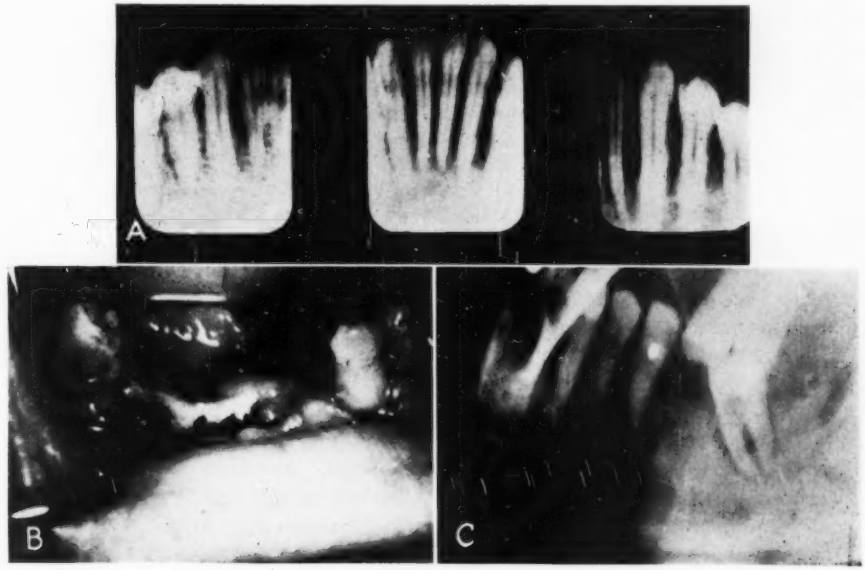


Fig. 5.—Case 3. A: Dental roentgenograms which were made previous to removal of the anterior teeth in the mandible demonstrate loss of supporting bone structure. B: Denuded necrotic bone of the mandible following the removal of teeth. C: Roentgenogram made three months after the teeth were removed discloses extensive irradiation osteonecrosis

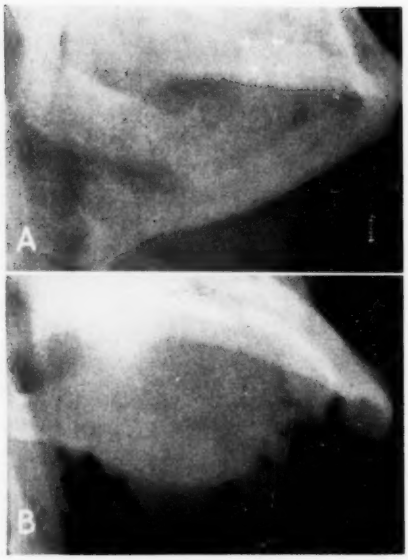


Fig. 6.—Case 4. A: Tooth socket of mandibular left cuspid which was removed is outlined with arrows. B: Extension of irradiation osteonecrosis was to the inferior border; there was sequestration and pathologic fracture of the mandible

tion of the mandible (inferior border) sequestrated and was removed, there was then a pathologic fracture (Fig. 6, *B*).

Six months after treatment was started the mouth was clean, the submandibular wound had healed and the patient was free of symptoms.

COMMENT—In talking with this patient over the months of treatment he said on various occasions, especially when he was in great pain and discomfort, "and to think this all started when the dentist removed my teeth." An attempt was made to explain to him that the underlying factor was that in destroying the tumor the adjacent tooth and jaw received some of the irradiation and that was the reason the wound would not heal following the extraction. He then said, "Well, why didn't they take out the teeth before treatment, they weren't any good anyway?"

■ *Case 5*

A man, aged 70, of fine stature, was referred for consultation on November 3, 1947. The chief complaint was pain in the submandibular region on the left side and beneath the tongue on the same side.

EXAMINATION—Clinical examination revealed cellulitis of the floor of the mouth, which extended into the submandibular region on the left side. The neck was sore to palpation. The patient was wearing a full lower denture with an extension which fitted into a cavity in the mandible. On removal of the denture exposed bone was seen in the base of the cavity, and pus was escaping from the region.

Roentgen examination demonstrated a bony defect of the inferior aspect of the left mandible just anterior to the angle. The superior margin of the left mandible from the region of the symphysis menti around to the midportion of the body was missing (Fig. 7, *A*).

PREVIOUS HISTORY—In December, 1922, the patient consulted his dentist because of a swelling under his tongue. He was advised that there was a cyst in the mandible which contained a tooth, and roentgen therapy was advised. Roentgen therapy was given in four doses, indicated as 800 r, 850 r, 800 r and 900 r. Factors were 60 minutes, 6 milliamperes,

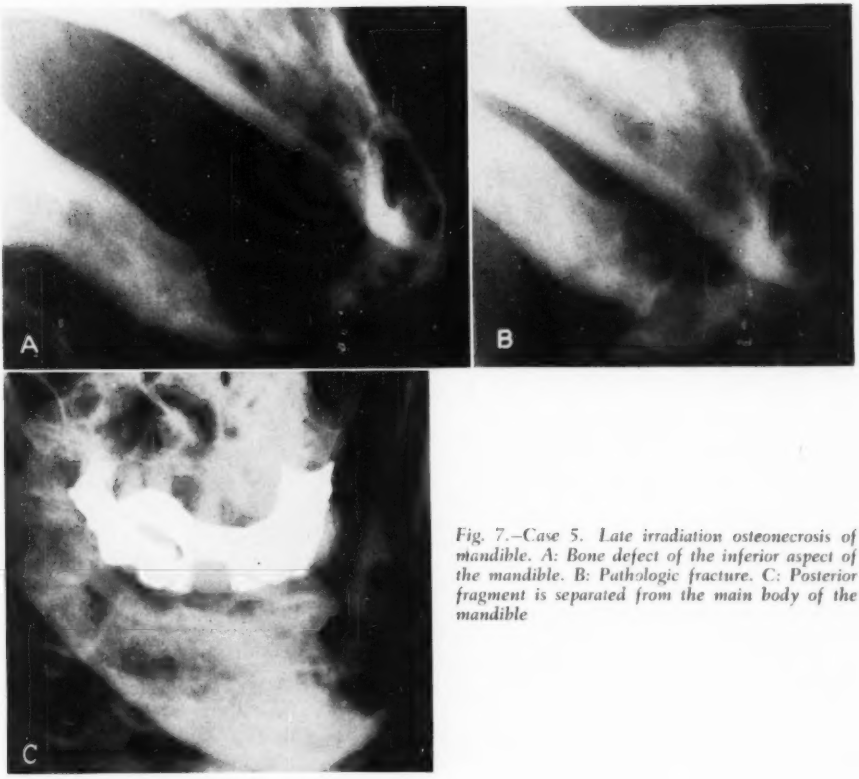


Fig. 7.–Case 5. Late irradiation osteonecrosis of mandible. A: Bone defect of the inferior aspect of the mandible. B: Pathologic fracture. C: Posterior fragment is separated from the main body of the mandible

50 cm. distance, 192 kilovolts, 1.3 mm. copper plus 2 mm. aluminum filter. It was felt that the roentgen therapy produced little in the way of results and several months later the cyst of the mandible with the encapsulated tooth was removed. Infection followed the operation and postoperative treatment continued for some time.

In November, 1926, irradiation with radium was given, and was continued until 1934; the dosage applied was as follows: November 19, 1926, 150 milligram hours; February 2, 1927, 300 milligram hours; November 25, 1927, 100 milligram hours; December 7, 1928, 90 milligram hours; March 26, 1932, 180 milligram hours; November 21, 1933, 150 milligram hours; July 26, 1934, 150 milligram hours. The radium was applied locally to the tumor.

Biopsies at different times during the course of treatment were made and histologically the tumor was a well differentiated type of fibrous tissue with a few malignant cells.

In July, 1935, saucerization of the mandible was done following the extraction of the left second molar tooth.

The laboratory report at this time read: "Several sections show bony tissue, osteoid tissues, a large amount of dense scar tissue and areas of epithelium. There is a chronic productive inflammation, with the formation of large quantities of young connective tissue, but no evidence of tuberculosis or neoplasms."

In October, 1935, a denture was designed for the mandible with an attachment that fitted into the cavity in the mandible.

This denture was remade on two occasions, and the patient wore it from 1935 to 1947.

In 1947 the patient had another denture constructed along the same lines as the original appliance. This denture caused some irritation but the patient did nothing about it for a few months until his dentist returned from a vacation.

FINDINGS—In the body of the edentulous mandible, on the left side there was a cavity of such extent that a large olive could easily be placed in it. It was lined with mucous membrane and at the base there was exposed bone which was not painful to the touch, and a foul-smelling yellowish exudate was escaping into the cavity. There was cellulitis of the floor of the mouth. The process appeared to be localized and ready to perforate through the skin in the submental region at the inferior border of the mandible.

Roentgenograms revealed a smooth bony defect of the inferior aspect of the left mandible, anterior to the angle and extending to the symphysis. There appeared to be a cystic area with some bony septa present, and there was a break in the cortex on the inner aspect. The exact origin of this defect is uncertain and examination of the previous roentgen studies would be of considerable help in evaluating the status of the present lesion. (This report was submitted before the facts in the history were obtained and no previous roentgenograms were available.)

TREATMENT—The denture was removed and the cavity irrigated daily. Penicillin therapy was started at 300,000 units daily and continued for 10 days. The cellulitis responded, the process localized and began to perforate through the skin in the submandibular region. Drainage was established.

On the ninth day after the discontinuance of penicillin, the patient had a generalized urticaria, a severe penicillin reaction, which necessitated his remaining in bed for several days. Drainage from the submandibular region continued.

On January 10, 1948, patient was yawning and felt "a click" in his mandible. Roentgenograms revealed a pathologic fracture of the left mandible with some downward displacement of the distal portion of the bone. A small fragment of bone on the inferior aspect of a distal segment was separated from the main body of the bone (Fig. 7, *B*, *C*).

The posterior fragment of the fractured mandible came forward into the cavity with the mandible and was clearly visible.

On January 20, the patient was admitted to Jackson Memorial Hospital. Under endotracheal anesthesia an extraoral incision was made along the inferior

border of the mandible and the fracture site exposed. Several small sequestra were removed, as was the denuded bone, without traumatizing the rest of the mandible. Drains were inserted and the wound closed. A specimen was sent to the laboratory for pathologic study. The report, on February 3, stated: "Section consists of an increased partly hyalinized connective tissue with chronic inflammatory reaction and over-production of newly formed vessels. The walls are hyalinized, the endothelial layer is swollen. No signs of malignancy. Diagnosis: Chronically inflamed hyalinized connective tissue."

In 10 days the intraoral and extraoral wounds were healed. There was some deformity on the left side of the face and the patient was desirous of having an appliance to improve his appearance and to aid in mastication. Impressions were made and a new appliance inserted. The patient has been wearing the denture for two years and manages very well. The oral mucosa appears healthy and the patient has gained weight and looks well.

COMMENT—Although the records of early therapy were made available in this case, it was impossible to obtain early roentgenograms. One is inclined to feel that the original tumor was benign. It is felt that pressure from the denture upon the mucosal lining of the cavity in the irradiated mandible had caused exposure of bone and infection resulted.

■ *Case 6*

A male, aged 73, was first seen in 1948. He had been treated elsewhere with roentgen ray for carcinoma of the palate. The patient's teeth were in good repair; there were seven in the maxilla and he was wearing a partial upper denture. In the mandible all teeth were present with the exception of the left first molar. In 1949 while attempting to chew his food one of the teeth fractured at the gum line and he removed the crown with his fingers. The patient was again examined and practically every remaining tooth had a deep cervical cavity. The anterior teeth of the mandible on clinical examination presented destruction at the cementoenamel junction which appeared to extend to the pulp chamber (Fig. 8, *A*). Roentgen examination confirmed this finding (Fig. 8, *B*). The teeth first turned a dark gray color and practically all fractured at the gingiva.

The condition was startling to myself and to the dentist who repaired this patient's partial denture in 1948. We had never seen such rapid destruction of tooth structure; in less than one year, practically every tooth was destroyed. Our only explanation was in the fact that the patient received extensive irradiation for carcinoma of the oral cavity.

■ *Case 7*

A male, aged 65, was seen on April 24, 1950, having been referred by a roentgenologist for the removal of posterior teeth previous to roentgen therapy for carcinoma of the left tonsil. The patient stated that he had just completed dental treatment; the dentist discovered the tumor originally. It was the patient's desire to return to his dentist for the extractions, which he did. The roentgenologist then treated the patient, and the results were excellent.

The patient was not seen again until

June 25, 1951. He was at dinner the previous night and as he bit into a crust of bread he felt something "snap" and found that he had fractured a mandibular incisor tooth. He returned to his dentist who was amazed at the vast destruction of practically every remaining tooth at the cementoenamel junction. The patient wished to have the fractured tooth root removed, but the dentist refused and suggested that the roentgenologist be consulted.

A consultation was arranged and I saw the patient with the roentgenologist. The treatment which had been given is shown in Figure 9, *A*.

Dental roentgenograms were made and practically every tooth showed destruction at the cementoenamel junction (Fig. 9, *B*).

The roentgenologist stated, "It would have been a far better procedure if all of this patient's teeth had been removed prior to roentgen therapy." With this statement I thoroughly agree because now teeth should not be removed.

■ *Case 8*

A male, aged 66, was seen in consultation on December 3, 1947. He was referred by a roentgenologist for the removal of teeth prior to therapy.

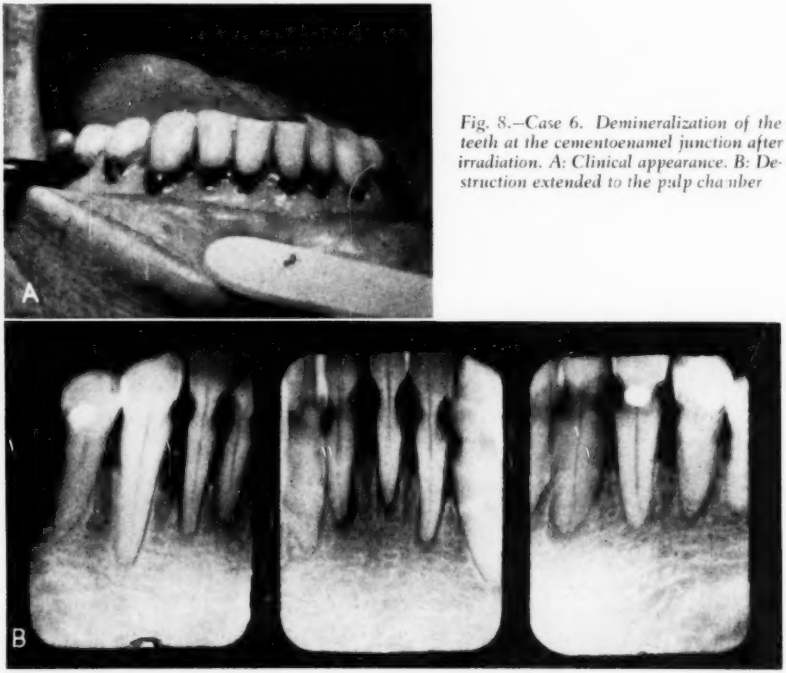


Fig. 8.—Case 6. Demineralization of the teeth at the cementoenamel junction after irradiation. A: Clinical appearance. B: Destruction extended to the pulp chamber

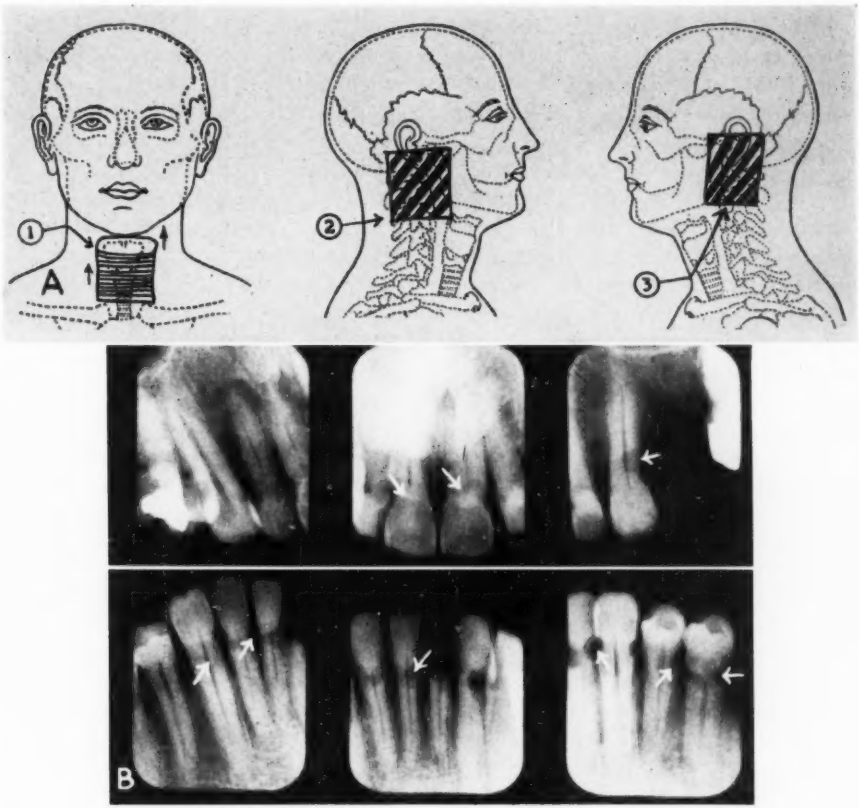


Fig. 9.—Case 7. Loss of tooth structure following roentgen therapy for carcinoma of tongue and floor of the mouth. A: Field 1: Cone 8 by 10 cm., 600 r in air, 220 r tumor dose. Field 2: Cone 8 by 10 cm., 3,500 r in air, 1,785 r tumor dose. Field 3: Cone 8 by 10 cm., 3,550 r in air, 3,160 r tumor dose. Total tumor dose was 5,165 r. B: Areas of demineralization indicated with arrows. One tooth fractured at the gingiva

PREVIOUS HISTORY—Four months previously the patient noticed a lesion in the floor of the mouth on the left side which caused some difficulty in wearing a partial lower denture which had recently been inserted. The lesion at that time was reported by the examining physician as an irregular papillomatous lesion of sessile nature which measured about 1 by 2 cm., situated on the left side of the floor of the mouth and extending on to the alveolar ridge. There was some suggestion that it was fixed to the periosteum of the bone. There was a small node palpable in the submaxillary region. There were three teeth adjacent to the lesion.

A biopsy November 18, 1947, revealed the lesion to be a highly infiltrative type of squamous cell cancer (grade III) which was extending to all margins of the section.

EXAMINATION—There were three remaining teeth on the right side of the mandible and three on the left side, the cuspid, first and second bicuspids. A lesion was present in the floor of the mouth which extended to the alveolar ridge adjacent to the three remaining teeth on the left side.

TREATMENT—On consultation with the roentgenologist it was deemed advisable to remove the mandibular teeth which were adjacent to the lesion. This was done on December 3, under procaine anesthesia, with forceps. The alveolar process was then trimmed with rongeurs, the socket packed with absorbable gelatin sponge and mucosa was trimmed, approximated and closed with silk sutures. Convalescence was uneventful and the sutures were removed on the fifth postoperative day.

The roentgenologist's report of his treatment is as follows: The patient was treated from December 13, 1947, to February 2, 1948, employing two external portals, cross-firing on the oral lesion. The lateral portal received 1,800 r and 3,600 r were delivered to the submaxillary portal. The following factors were employed: 200 kilovolts, 20 milliamperes, 50 cm. skin target distance, 0.5 mm. copper plus 1 mm. of aluminum added filtration. In addition, 4,000 r were delivered directly to the lesion through an intraoral cone employing the following factors: 200 kilovolts, 20 milliamperes, 30 cm. skin target distance, 0.25 mm. copper plus 1 mm. of aluminum added filtration.

The patient was seen a year later and there was no evidence of residual disease in the mouth. He had gained weight and was anxious to have his partial denture reconstructed. He was advised that it would be well to delay the wearing of a denture over the treated area.

On April 13, 1949, the patient returned to the office complaining of a "blister" on the alveolar ridge. The redesigned partial lower denture which he had been wearing for three weeks caused pain. Examination revealed an area of exposed bone about 1 cm. in diameter. It was not painful to touch but the sourrounding mucosa was painful. The area was cleansed and the exposed bone was covered with balsam. A roentgenogram of the region was negative. The patient was asked to discard the denture. He was seen frequently for several weeks and the area of denuded bone became larger, measuring about two inches over the alveolar ridge and extending both lingually and buccally to the inferior border of the mandible. An instrument could be passed distally under the mucosa an inch beyond the border. Repeated roentgenographic examination of the affected side of the mandible was negative.

Several methods of treatment were discussed, such as resection of the mandible and the Daland method; however, the patient's family decided to take the patient to a clinic elsewhere.

A report from the institution where the patient was admitted reads "Operation performed April 25, 1950. The left mandible was removed by intraoral ap-

proach. Histological study showed osteosclerosis."

COMMENT—After the diagnosis of squamous cell carcinoma was made and treatment planned, the teeth in the region to be irradiated were removed. In 10 days the mucosa had healed completely and irradiation was started. Treatment was completed, and the patient was discharged with instructions as to oral hygiene. When seen a year later the oral mucosa appeared healthy and the patient was comfortable. Again he was advised not to wear a denture; however, two months after this the patient came to the office complaining of a "blister on the gum" which appeared under a denture that was constructed three weeks previously. The bone was denuded and there is little doubt that trauma to the irradiated area was the contributing factor.

■ *Case 9*

A male, aged 62, was referred for consultation on November 6, 1948. The patient was on vacation in Miami and during his stay discovered a sharp piece of bone on the posterior portion of the mandible on the left side.

EXAMINATION—Clinical examination revealed the superior alveolar portion exposed posterior to the molar region. On manipulation, which was painful, it appeared that there was a fracture at the angle of the mandible; the patient denied any trauma. He was wearing a partial lower denture.

Roentgenographic examination revealed a large defect in the posterior portion of the body of the mandible. The gap measured about 2 cm. in width across its widest point superiorly and about 1 cm. in width at the narrowest point inferiorly. Near the center of the defect a loose, rounded, free bony fragment, measuring about 6 mm. in diameter, was present.

PAST HISTORY—In 1933 a diagnosis of squamous cell carcinoma of the tongue and palate was made in another city. A report from the physician familiar with the case stated that radium was used in the treatment of the lesions and that the external carotid artery was ligated on the affected side because of an extensive slough that occurred in the oral cavity following treatment with radium.

PROGRESS—The patient returned home and a large sequestrum was removed by the dentist who designed the partial denture. An oral surgeon who was consulted wrote, "Had I been consulted previous to the insertion of this denture I would definitely have advised against the posterior extension of this appliance, for it is my experience, as no doubt yours, that radiatized tissue is easily traumatized and will never stand the pressure of a tissue form restoration."

Although investigators, the radiotherapist and the dentist have attempted to disseminate facts with regard to the effect of irradiation on dental tissues, there are still those who will first treat the patient and then seek consultation after complications have arisen.

■ *Case 10*

The patient had a lesion in the floor of the mouth extending into the gingival mucosa (Fig. 10, *A*). It was proved after

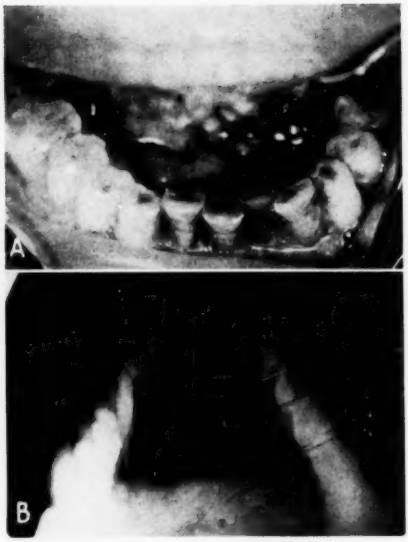


Fig. 10.—Case 10. Carcinoma of the floor of the mouth. Treatment was started without first removing teeth. A: Lesion under tongue. B: Roentgenogram demonstrates involvement of bone supporting the teeth

biopsy and pathologic study to be carcinoma. Roentgen treatment was started and the patient developed a sore mouth; he was then sent to a dentist to have the teeth removed. A dental roentgenogram demonstrated that the carcinoma had already involved the mandible (Fig. 10, *B*).

■ *Case 11*

The patient was first seen in the tumor clinic at Jackson Memorial Hospital. He was advised to have a biopsy done of a tumor under the tongue and floor of the mouth anteriorly. It was also explained to the patient that if roentgen treatments were recommended after the pathologic report was received, that the mandibular teeth would be removed; the patient refused.

He was seen a year later, having already been treated in another city. He returned to Miami and applied to the office of an oral surgeon to have the teeth removed. The oral surgeon refused, but sent him to the tumor clinic at Jackson. The teeth were loose, the floor of the mouth was necrotic (Fig. 11, *A*), and the patient was acutely ill. Roentgenograms showed involvement of the bony support of the teeth (Fig. 11, *B*). The patient died six months later.

■ *Summary and Conclusions*

The oral surgeon who has had experience in handling cases of irradiation osteonecrosis should pass on to others information that he has accumulated not only in the treatment, but also in prevention.

The subject of irradiation osteonecrosis of the jaw bones has been presented in the past by such authorities as del Regato, Watson, Scarborough, Kanthak, Ivy and Thoma, in clear and thorough fashion.

The treatment approach as reported in the literature goes from the conservative or "wait until sequestration" to the extreme of resection of the affected part.

With the increasing frequency of the use of high voltage roentgen rays in the treatment of cancer of the oral cavity, the effects on normal tissue have become increasingly important to the radiotherapist and to the oral surgeon.

If the patient is cured of cancer in or about the oral cavity by means of irradiation, and then even years later post-irradiation changes occur within the jaw

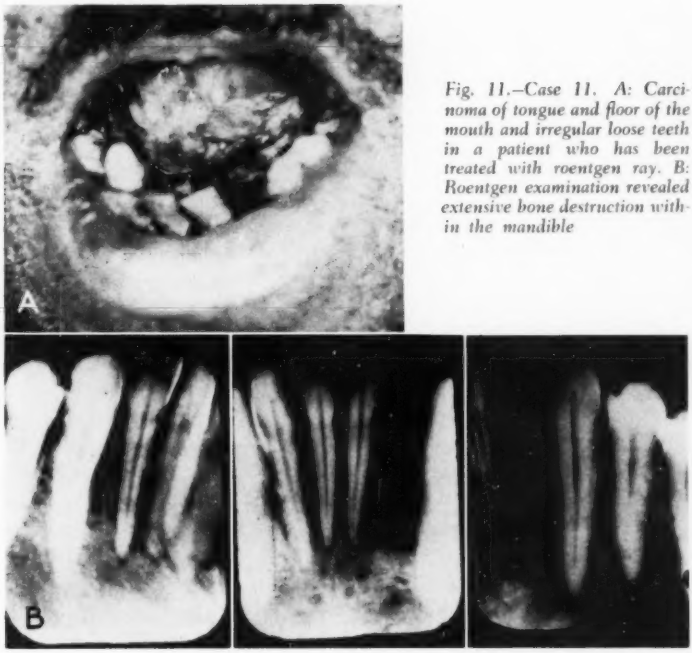


Fig. 11.–Case 11. A: Carcinoma of tongue and floor of the mouth and irregular loose teeth in a patient who has been treated with roentgen ray. B: Roentgen examination revealed extensive bone destruction within the mandible

bones the patient is usually seen by the oral surgeon. The patient may soon forget the primary lesion because now he is "cured," but if teeth are removed from a region which previously had been irradiated (with adequate dosage to destroy the cancerous lesion), irradiation necrosis may follow the extraction. The prosthodontist may share this grief if an appliance is inserted which exerts pressure on irradiated mucosa.

Teeth, irrespective of their condition, should be removed before irradiation unless they are adequately protected, the alveolar process should be prepared and the mucosa sutured. The mucosa should be completely healed before the treatment is started.—*1342 Dupont Building.*

A technic for the roentgenographic examination of impacted mandibular third molars

■ *Albert G. Richards, B.S., M.S., Ann Arbor, Mich.*

The expression "to be forewarned is to be forearmed" definitely applies to the practice of oral surgery. A thorough roentgenographic examination of a region provides the oral surgeon with a preview of the problem before an operation is attempted. After the roentgenographic evidence is evaluated carefully, a sound operating procedure can be planned with good assurance of its successful completion.

Impacted mandibular third molars frequently are portrayed inadequately on periapical roentgenograms because of incorrect positioning of the film packet in the mouth. It is difficult to position the film packet correctly because the exact position and configuration of the impacted tooth are not known. A roentgenographic technic has been been designed to simplify the proper placement of the film packet in the mouth and to indicate when it is necessary to modify either the vertical or horizontal angulation of the x-ray beam for the examination of impacted mandibular third molars.

Two periapical roentgenograms of the mandibular molar region are required with this technic. The first film packet serves as a "scout" film and is positioned in the mouth with its upper edge parallel with and one-eighth of an inch above the occlusal surfaces of the erupted molars. The center of the packet is aligned roughly with the buccal groove of the second molar. The proper vertical and horizontal angulations of the x-ray beam are determined by directing the central ray at the neck of the second molar and parallel with both its occlusal and distal surfaces, respectively. The extent to which the third molar is included on this initial film is determined largely by the size and position of that tooth in the jaw. If the third molar is impacted horizontally, the image of the apexes and portions of the roots probably will not be included in the roentgenogram (Fig. 1, *A*). A roentgenogram is viewed normally from its lingual aspect (Fig. 1, *A*), but to apply this technic, the roentgenogram must be turned over and viewed from its buccal aspect. The important details of Figure 1, *A*, when viewed from a buccal aspect, are shown by a line drawing in Figure 1, *B*.

The position of the second film packet in the mouth is governed by information derived from the initial roentgenogram. The initial roentgenogram is placed with its lingual surface against the sensitive side of the second film packet. Then the film packet is rotated slightly behind the roentgenogram until its lower posterior corner extends sufficiently far beyond the incomplete image of the third molar to

Assistant professor of dentistry, School of Dentistry, University of Michigan, Ann Arbor, Mich.

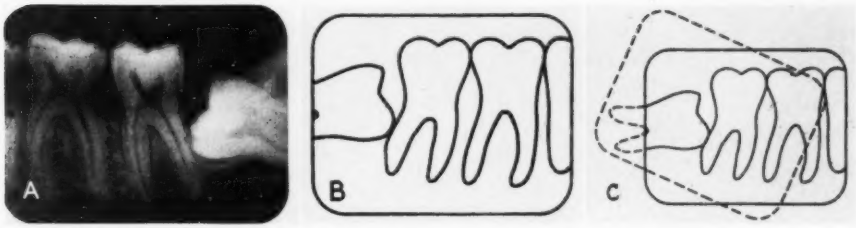


Fig. 1.—A: Periapical view of the right mandibular molar region showing incomplete image of the third molar. B: Illustrating important details of A when viewed from a buccal aspect. C: Second film packet (dotted lines) is rotated slightly behind the initial roentgenogram (solid lines) until its lower posterior corner extends sufficiently beyond the image of the third molar to include the missing roots and apexes

include the missing roots and apexes (Fig. 1, C). Individual judgment, coupled with whatever clues the initial roentgenogram offers regarding the number and configuration of the missing roots, determines the position of the lower posterior corner of the packet relative to the initial roentgenogram. The first roentgenogram is indicated with solid lines in Figure 1, C, while the second film packet and the hypothetical position and form of the missing roots and apexes are shown with dotted lines.

With the initial roentgenogram still

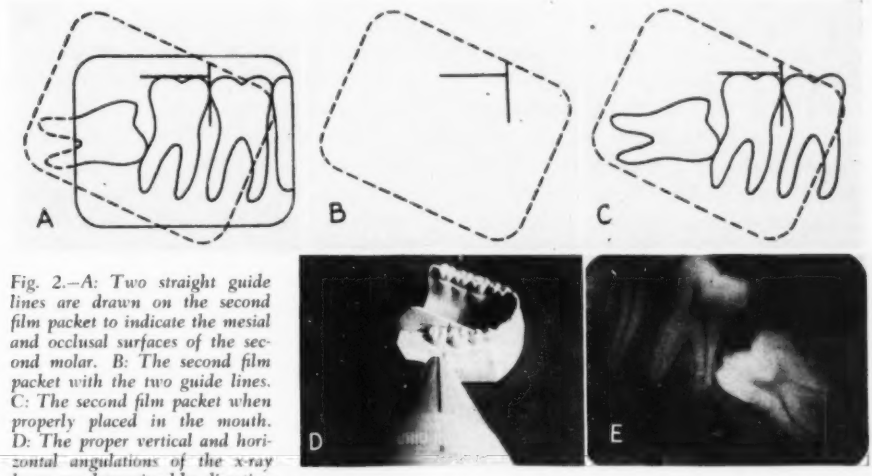
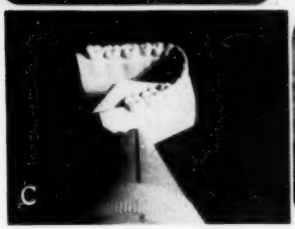


Fig. 2.—A: Two straight guide lines are drawn on the second film packet to indicate the mesial and occlusal surfaces of the second molar. B: The second film packet with the two guide lines. C: The second film packet when properly placed in the mouth. D: The proper vertical and horizontal angulations of the x-ray beam are determined by directing the central ray at the neck of the second molar and parallel with both its occlusal and distal surfaces. E: Roentgenogram produced according to the technic described

Fig. 3.—A: Showing increase in vertical angulation necessary if film packet cannot be positioned sufficiently deep in the mouth. B: Roentgenogram produced according to the technic described in A

C: Showing distomesial change in horizontal angulation necessary if the film packet cannot be positioned sufficiently far posteriorly in the mouth. D: Roentgenogram produced according to the technic described in C



lying on the film packet, the point of a pencil is inserted carefully between them and two straight guide lines are drawn on the packet. The first, a vertical line, indicates the mesial surface of the second molar, and the second, a horizontal line, indicates the occlusal surface of the same tooth (Fig. 2, *A*). The second film packet with the two guide lines drawn on it is illustrated in Figure 2, *B*.

The second film packet is positioned in the mouth with its vertical guide aligned with the mesial surface of the second molar and the horizontal line located even with the occlusal surface of the same tooth (Fig. 2, *C*). If the lower anterior corner of the packet presses too deeply into the floor of the mouth, that offending corner should be bent back out of the way. The packet is retained in position by the patient's index finger. The proper vertical and horizontal angulations of the x-ray beam are determined by directing the central ray at the neck of the second molar and parallel with both its occlusal and distal surfaces respectively (Fig. 2, *D*). Figure 2, *E* shows a roentgenogram resulting from this technic.

Sometimes, owing to anatomic interference, it is impossible to position the film packet in the mouth exactly according to the two guide lines. Perhaps, in one instance, the vertical line could be orientated properly, but the packet could not be positioned sufficiently deep in the mouth to align the horizontal guide line with the occlusal surface of the second molar (Fig. 3, *A*). Nothing is to be gained by exposing the film packet in this position unless the vertical angulation is changed to compensate for the unfavorable position of the film packet. In this instance, the vertical angulation should be increased to project the image of the buccal cusps upward to meet the horizontal guide line on the film packet (Fig. 3, *A*). The resulting roentgenogram portrays a large amount of the occlusal surface of the second molar, but it also includes all of the impacted third molar (Fig. 3, *B*).

Other circumstances might allow the film packet to be positioned deep enough in the mouth so that the horizontal guide line on the film packet could be aligned with the occlusal surface of the second molar, but perhaps the packet could not be positioned far enough posteriorly to allow the vertical guide line to coincide with the mesial surface of the second molar (Fig. 3, *C*). Under these circumstances, the horizontal angulation should be modified to project the mesiobuccal edge of the second molar anteriorly to coincide with the vertical guide line on the film packet. The resulting roentgenogram portrays overlapping of the crowns of the teeth, but it also includes all of the impacted third molar (Fig. 3, *D*).

■ *Summary*

A roentgenographic technic has been described which simplifies the proper placement of the film packet in the mouth, and also indicates when it is necessary to modify either the vertical or horizontal angulation of the x-ray beam for the examination of impacted mandibular third molars.

Supplemental report on meniscectomy in treating lesions of the temporomandibular joint

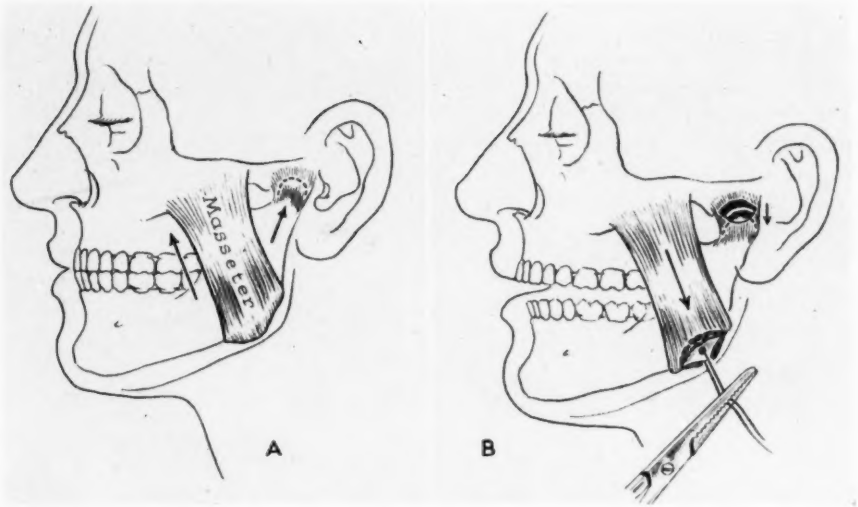
■ *Reed O. Dingman, D.D.S., M.D., Ann Arbor, Mich.*

In the July, 1951 issue of the JOURNAL OF ORAL SURGERY the problem of meniscectomy in the treatment of lesions of the temporomandibular joint was discussed.[1] The conclusions were based on a series of 12 cases in which the meniscus was removed from the temporomandibular joint for the correction of chronic progressive, irreversible, painful internal derangements of the temporomandibular joint. Since that time, an additional 15 cases have been operated on, with equally good results.

Another feature has been added to the operative technic, which makes the procedure much easier. In the original communication it was stated that a mouth prop or a bite block should be placed between the posterior teeth with hand pressure applied upward on the symphysis. This maneuver was done to distract the

Associate professor of oral surgery, School of Dentistry, University of Michigan, Ann Arbor, Mich.

1. Dingman, R. O., and Moorman, W. C., Meniscectomy in the Treatment of Lesions of the Temporomandibular Joint. *J. Oral Surg.* 9:214 (July) 1951.



The joint cavities can easily be seen and the meniscus margins identified by downward retraction at the angle of the mandible

head of the condyle from the glenoid fossa, but was highly unsatisfactory.

In order to make the procedure easier, a small incision is made at the angle of the mandible on the involved side and the angle of the mandible is exposed (illustration). The muscular attachments of the masseter muscles are incised and the muscle is raised upward a few millimeters to expose the bone. A hole is drilled through the bone, and a 28 gage stainless steel wire is passed through the hole in the angle of the mandible. Both ends of this wire are grasped with a large hemostat (illustration). Tension is applied on the wire by an assistant. This makes it possible to distract the head of the condyle some distance downward to provide an excellent view of the interior of the temporomandibular joint.

In resistant cases intravenous curare is given to obtain muscular relaxation. This is best given as Metubine Iodide (dimethyl ether of d-tubocurarine), 2 or 3 cc. The patient must be observed carefully after the injection of curare for signs of respiratory paralysis.

Progressive advanced case of osteitis deformans

■ *Wm. J. Byatt, D.D.S., and S. Ash, D.D.S., Greystone, N. J.*

In 1876 Sir James Paget first described a disease which is one of a large group of conditions characterized by changes of osseous structures.

These changes are disturbances in metabolism due primarily to physiological disturbances, not to pathology of bone-forming elements.

The first bony involvement is a rarefying osteitis and almost simultaneously a formation of new bone is deposited near the periosteum and also near the marrow cavity, without apparent regard for the normal architecture for these bones. This alteration in architecture is due to irregular resorption of bone by osteoclasts and its replacement by osteoid tissue which calcifies normally.

The disease was something of a medical curiosity and Paget collected only 23 cases. The incidence varies from 1:10,000 to 1:150,000 hospital patients. There is great difficulty in correctly recognizing the disease in its earliest stages. Burket[1] estimates that if a roentgenographic examination is made on all hospital patients evidence of mild Paget's disease would be found in 1:3,000 patients examined.

■ *General Manifestations*

The condition is characterized by an overgrowth and increase in the size of the bones, with a concomitant softening, which causes a change in shape of the bones under stress of function.

Paget's original treatise is descriptive of the general condition.[2]

> The disease affects most frequently the long bones of the lower extremities and the skull and is usually symmetrical; the bones enlarge and soften; those bearing weight yield and become unnaturally curved and misshapen. The spine, whether by yielding to the weight of the overgrown skull or by change in its structure, may sink and seem to shorten, with gradually increased dorsal and lumbar curves; the pelvis may become wide; the necks of the femora may become nearly horizontal; but the limbs, however misshappen, remain strong and fit to support the trunk.

The etiology is unknown. The age group is generally between 30 and 50 years. There appears to be a definite predilection for males with the ratio about 41 males to 24 females. The onset is insidious; development of the characteristic symptoms is slow; pain in the bones and head may be present in the beginning, but it becomes lessened as time elapses; the body generally remains in good repair. The disease is, however, a dystrophy

From the department of dentistry, New Jersey State Hospital, Greystone Park, New Jersey.

1. Burket, Lester W., *Oral Medicine*. Philadelphia: J. B. Lippincott Company, 1946.

2. Pemberton, Ralph, Diseases of the Bones. In *Bedside Diagnosis*. Philadelphia: W. B. Saunders Company, 1920.

rather than a true inflammation as the name osteitis implies.[3]

Arteriosclerosis is the most common pathologic condition associated with this disease.

An etiologic role has also been ascribed to syphilis and endocrine dysfunction; it appears, however, that syphilis, if present, has no apparent relationship to this disease except as an associated infection.

Paget's disease is differentiated grossly from acromegaly which generally results in an increase in size of the mandible, lower half of the face and extremities, whereas Paget's disease generally results in greater enlargement of the maxilla and upper half of the skull and the long bones of the body.[2] Also the gross appearance of the fingers and body stature along with roentgen findings make the differential diagnosis evident. In Paget's disease "enlargement of the cranium, so that the patient continuously has to buy larger hats, is a typical feature."[4]

Karsner[3] states, "Found in bones subject to stress, the trabeculae of spongy bones become prominent and irregular, and the compacta of long bones thick and dense."

The distribution of the osseous involvement, generally symmetrical, is found to be in this order:[2] skull, tibia, femur, spine, pelvis, ribs, radius and ulna. The fibula has not been reported involved in Paget's disease.

Yater[5] reports, "X-ray examination shows (rarefaction and) increased density of the bones, absence of normal bone markings, thickening of the bone cortices, localized periosteal thickenings, deformities, and a fuzzy appearance of the outer table of the skull, which is very characteristic of Paget's disease."

The localized areas of osteoporosis and bone-building in the flat bones produce the curvilinear markings which are pathognomonic of this disease.[1] Osteoporosis is an incorrect term because it implies loss of protein matrix which does not occur in Paget's disease. There is, rather, osteoclasis and irregular redeposition of bone through normal osteoid tissue.

Headache of migraine character, psychic anomalies, or disturbances on the part of the organs of sense,[6] ocular disturbances due to intracranial pressure upon the nerves as they leave the skull through the various foramens and skin pigmentation have been observed.[2] It has been reported that a gradually increasing difficulty in hearing in consequence of narrowing of the bony external passage of the ear may be considered characteristic for Paget's disease.[6]

■ *Oral Aspects*

Abnormal changes from Paget's disease may first occur in the oral cavity and its associated structures.

> . . . The most frequent and extensive changes are observed in the maxilla. . . . There is a marked osteoporosis of the maxilla with localized areas of increased density. These changes result in a loss of the trabecular detail in the x-rays. With the local areas of increased density the radiolucent areas produce the char-

3. Karsner, Howard T., *Human Pathology*, ed. 6. Philadelphia: J. B. Lippincott Company, 1942.

4. Thoma, Kurt, H., *Oral Diagnosis*, ed. 2. Philadelphia: W. B. Saunders Company, 1943.

5. Yater, Wallace M., *Fundamentals of Internal Medicine*, ed. 2. New York: Appleton-Century-Crofts Co., Inc., 1944.

6. Schüller, Arthur, *Roentgen Diagnosis of Diseases of the Head*. St. Louis: C. V. Mosby Company, 1918.

acteristic "cotton wool" appearance of the bone. . . . The size of the dental arch is increased and spacing of the teeth is common. The mucosa covering the maxillary bones becomes stretched and numerous fine capillaries become visible.[1]

Cases studied by Fox and Burket[1] revealed "nobby growths" and irregularity of the roots of the teeth throughout both jaws.

The teeth become loose due to the destruction of the supporting alveolar bone but there is no roentgenologic or histologic evidence of abstraction of calcium from the teeth. X-rays of the teeth show more than normal pulpal calcifications. There is a marked hyperplasia of the cementum histologically and roentgenologically.

Koch[7] reported two cases of Paget's disease. His first case followed over a nine year period showed bone changes limited especially to the left side of the maxillary arch, with practically no change in the calvaria or other bones. In the ninth year of observation the patient showed an ". . . increase in width in the maxillary arch on the left side, upper incisor area, right tuberosity area, and onset of changes in the upper right cuspid area." In the second case ". . . no significant bone changes were evident in the maxillary arch." The mandible was normal as were all other bones except the skull which presented a typical Paget's appearance roentgenographically.

Clinical changes produced in the face are uncommon. The first reported case from the Oral Diagnosis Clinic of the School of Dentistry, University of Pennsylvania, was in 1935. Since then three additional cases have been noted in approximately 50,000 new admissions.[8] The face is seldom affected below the supraorbital margins.

Numerous case reports[8-11] have appeared in which the maxilla or infrequently the mandible have been involved. "Jaw roentgenograms in 138 cases of generalized Paget's disease revealed involvement of the maxilla in twenty cases, and of the mandible in three cases."[8] It is, however, unusual to find a case of generalized Paget's disease which shows such great enlargement of the maxilla as the case reported here.

Paget discovered no hereditary factor in the disease but other investigators found instances of its presence in members of the same family.[8]

Rushton[12] reported the case of a woman 68 years of age in which he noted progressive enlargement of the maxilla for 10 years. Three maxillary reductions were done but growth continued, causing obvious prominence of the upper jaw. The palate was broad and the alveolar process bulged outward and downward and contacted the edentulous right molar region of the mandible. Many enlarged venules were seen upon it. The only three remaining upper teeth had been carried far outward in new growth of alveolar bone; cementum covered the teeth. "The mandi-

7. Koch, William E., Jr., Oral Manifestations of Paget's Disease. *D. Radiog. & Photog.* **23**:13 (No. 1) 1950.

8. Novak, Alton J., and Burket, Lester W., Oral Aspects of Paget's Disease, Including Case Reports and Necropsy Findings. *Am. J. Orthodont. (Oral Surg. Sect.)* **30**:544 (Sept.) 1944.

9. Bowden, A. C., A Case of Paget's Disease (Osteitis Deformans) With Oral Symptoms. *Am. J. Orthodont. (Oral Surg. Sect.)* **28**:111 (Feb.) 1942.

10. Newman, A. T., and Hyman, M., Paget's Disease: Report of Case. *J.A.D.A.* **30**:237 (Feb.) 1943.

11. Jacobs, Max, The Jaws in Paget's Disease (Osteitis Deformans): With Special Reference to Osteoporosis Circumscripta Cranii. *Am. J. Orthodont. (Oral Surg. Sect.)* **31**:104 (Feb.) 1945.

12. Rushton, Martin A., Osteitis Deformans Affecting the Upper Jaw and Osteoporosis Circumscripta of the Skull. *Brit. D. J.* **84**:189 (May 7) 1948.

Fig. 1.—Appearance of patient in February 1940. Note enlargement of maxilla. Mandible is normal

ble showed only an advanced degree of osteoporosis of senile type, and this condition was found to be present also in spine, pelvis and long bones."[12]

■ *Report of Case*

The following report is on a fully developed characteristic case of Paget's disease discovered in one of the patients at the New Jersey State Hospital.

The patient was a white male born in 1889. Facts regarding his early developmental life are unknown. Some years ago he had pleurisy and pneumonia and was operated on at the time for a lung infection. He was ill a year. He had all his teeth extracted years ago (for reasons now unknown) but never wore dentures. Use of drugs and alcohol were denied, but the patient smoked heavily. In 1914 he married; there were seven children all apparently well except a son who died of pneumonia at the age of eleven days and a daughter who was admitted to this hospital in 1947 with a diagnosis of psychosis with mental deficiency. On July 28, 1938, the patient was admitted to this hospital with a diagnosis of dementia praecox—paranoid type.

The patient was fairly well developed and nourished on admission. Arteries showed a two plus sclerosis; blood pressure was 170/96. A fine tremor of the fingers was noted.

The dental and oral examination revealed a massive maxilla (Fig. 1).

Laboratory determinations showed a faint trace of albumin in the urine; a urea nitrogen of 15.2; a nonprotein nitrogen of 21.6; creatinine of 1.9; a blood sugar of 127 mg. per cent; blood calcium of 10.5; other determinations were essentially normal.

The patient suffered with headaches, dizzy spells and ringing in the ears which may be indicative of Paget's disease. Since his admission he has presented no untoward symptoms and has had only com-

mon and ordinary complaints such as colds.

In the family history there are no familial traits that can be traced physically. There is a definite familial mental aberration which has resulted in the hospitalization of his father, mother and two brothers. He is one of seven children. Of the patient's seven children, one died of a febrile disease (pneumonia) in infancy and one is a patient at this hospital. His wife and other children are apparently well.

The patient is edentulous; clinically, the mandible is normal, but the maxilla is tremendously enlarged. The only obvious area of great enlargement has been the maxilla.

A compound-plaster impression was taken of the maxillary jaw in February, 1940. At that time it appeared three times the area of the normal size, measuring 86 mm. across its widest lateral area and 95 mm. anteroposteriorly. In the bicuspid regions the crest of the ridge was at its maximum height, 20 mm. from the mucobuccal fold.

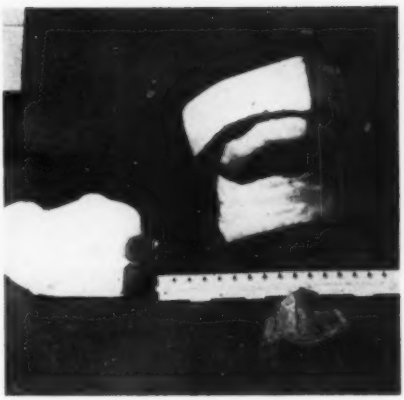


Fig. 2.—On the left is a cast of the patient's maxilla. In the background, casts of the maxilla and mandible in articulator show Class II malocclusion. A cast of an average maxilla is shown in the foreground

The mandibular model was made and articulated with the maxillary model for observation and contrast; the case repre-

Fig. 3.—Appearance of patient in July 1950. The skin is stretched tightly across the zygomatic arches. Exostoses on the zygomatic processes appear as bulges

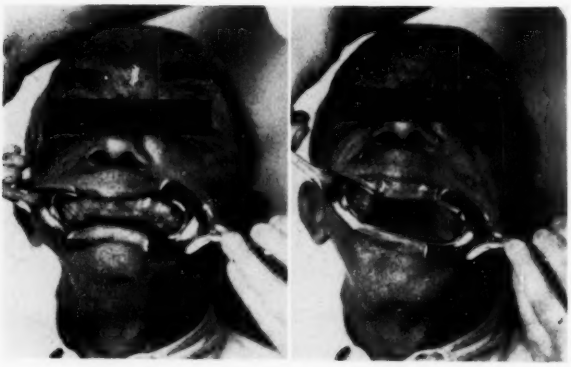


Fig. 4.—Views of maxilla, showing enlargement over 10 year period

sented extreme Class II malocclusion (Fig. 2).

In July, 1950, the patient was recalled and new pictures and impressions were taken for observation of changes over the 10 year period.

This patient presents a most unusual if not somewhat startling appearance. Whereas normal facial contour varies from oval to ovoid to square, the contour here is more toward a diamond-shape. The skin is stretched tightly across the zygomatic arches and wrinkles radiate from these points outward as a result of the tension in the tissues (Fig. 3).

On both sides exostoses are present on the facial surfaces up to the zygomatic processes of the maxilla and appear as bulges in the cheeks.

Much difficulty was encountered in taking the impression because the maxilla had apparently increased in size whereas the orifice of the mouth had not changed (Fig. 4). Therefore, it was necessary to make the impression in sections.

The model showed new measure-

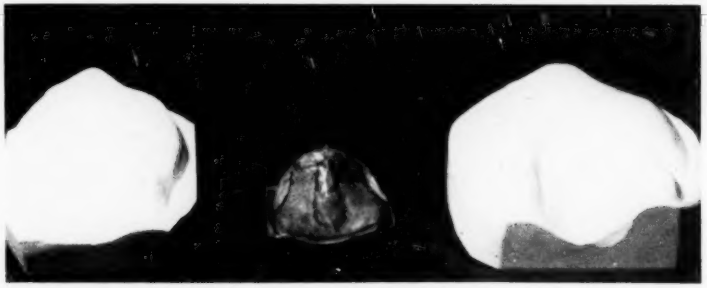


Fig. 5.—Cast of an average maxilla in center; 1940 cast is on the left; 1950 cast is on the right

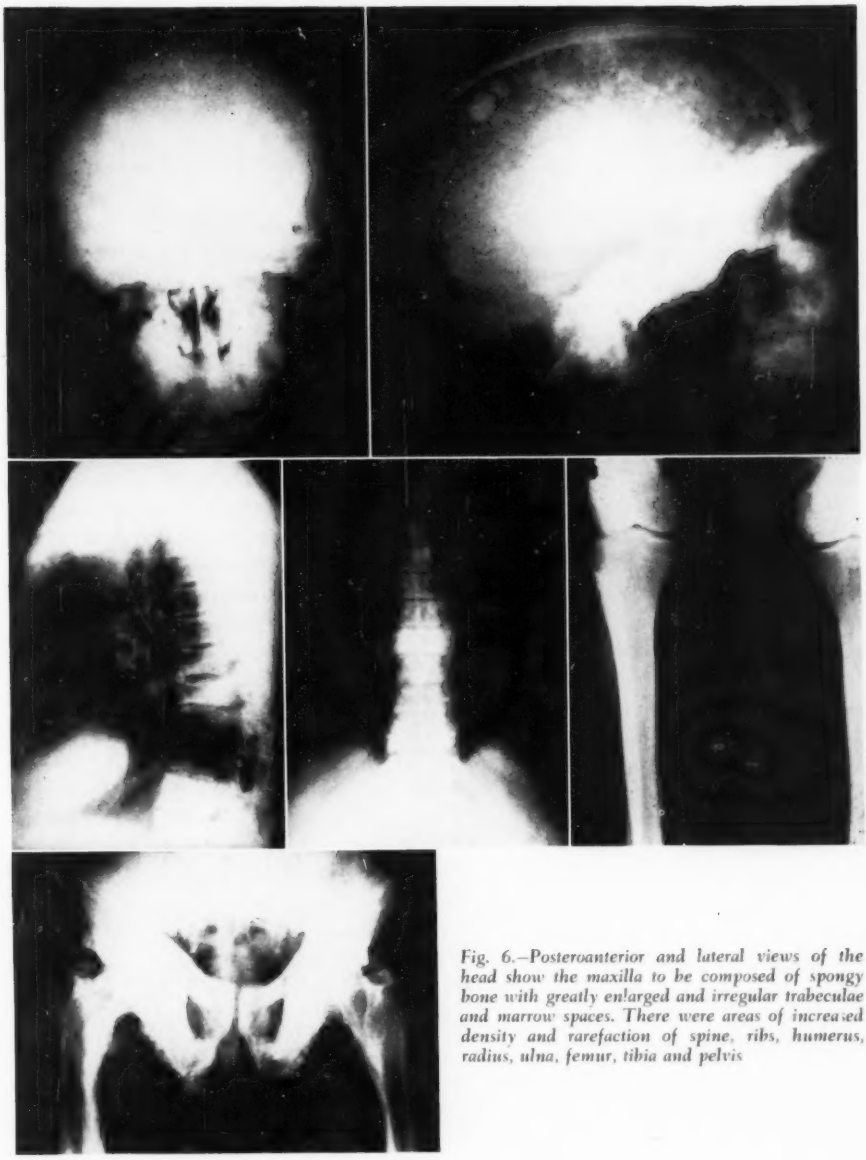


Fig. 6.—Posteroanterior and lateral views of the head show the maxilla to be composed of spongy bone with greatly enlarged and irregular trabeculae and marrow spaces. There were areas of increased density and rarefaction of spine, ribs, humerus, radius, ulna, femur, tibia and pelvis

ments for the maxilla: laterally across the widest area 114 mm., and anteroposteriorly 103 mm. Whereas previously the ridge crest was at its greatest height in the bicuspid regions, it had flattened, and now in the anterior region the ridge crest measured 23 mm. from the mucolabial fold.

This indicates an over-all maxillary growth of approximately 69 per cent when compared with the condition of 1940, which even then was extremely large (Fig. 5).

The mandible remained about its previous size. A small loss of bone may be noticed on comparison; this is probably owing to lack of stress on this bone during masticatory function.

Posteroanterior and lateral roentgenograms of the head show the maxilla to be composed of spongy bone with greatly enlarged and irregular trabeculae and marrow spaces (Fig. 6).

Roentgenograms of the head and the long bones of the body showed the characteristic Paget's disease changes: much thickened calvaria measuring approximately 20 mm.; cotton-puff appearance of skull bones; compressed vertebra, almost fractured; areas of increased density and rarefaction of pelvis, humerus, radius, ulna, femur, tibia, ribs and spine.

All laboratory determinations were within a normal range except the alkaline phosphatase result. It is significant that alkaline phosphatase values elevated over 13 King-Armstrong units is considered indicative of either malignant bone tumors, Paget's disease or rickets.[13]

The patient showed a glabella-occiput length of 23.4 cm. and a bitemporal width of 17.8 cm. This is a cephalic index of 76; a more long than wide head. The average cephalic index for this type of individual is 81.

The cephalic index is the shape of the head computed from the length and width of the skull. A cephalic index of 100 would mean that the width equaled the length; a perfectly round head. The nearer to 100 the index, the wider or broader the head; the further from 100 the index, the longer the head.[14]

In the act of smiling which raises the upper lip, the maxilla is dramatically evident as a near protrusion from the mouth. The mucoepithelium shows many fine capillaries and small blood vessels over its entire area of the oral cavity.

The patient is asymptomatic. He experiences apparent difficulty with mastication, but is cooperative and no special diet or feeding is necessary. His speech is not overly obstructed by his physical condition and lack of dentition.

It is with much interest that this patient will be observed over the ensuing years to further this report of the disease and its manifestations.

13. Kolmer, John A., and Boerner, Fred, *Approved Laboratory Technic*, ed. 4. New York: Appleton-Century-Crofts Co., Inc., 1945.

14. Goldenweiser, Alexander, *Anthropology*. New York: F. S. Crofts Co., 1945.

Preoperative and postoperative sedation for children

■ *George W. Matthews, D.D.S., M.S., Birmingham, Ala.*

Every oral surgeon who administers general anesthetics in his office has had difficulty with children. The metabolic rate is higher at age 5 or 6 than at any other period in life and children of this age group require an amazing amount of anesthetic. The surgical problem when dealing with badly broken down deciduous molars before the roots are absorbed and with permanent first molars is one that requires a completely anesthetized patient for complete tooth removal.

Lack of premedication is one of the chief reasons for anesthetic difficulties with children. Premedication makes a child much easier to manage and also reduces greatly the amount of anesthetic required. In our practice we use pentobarbital elixir, which contains about 16 mg. (¼ grain) pentobarbital in 4 cc. (1 dram) of the elixir. Children 5 or 6 years old require 2 drams and those 10 or 12 years old can take 3 drams. This preparation is pleasant tasting, and children like to take the elixir. The medication should be given about half an hour before the operation. Highly excitable children soon become quiet after taking the medication and are receptive candidates for general anesthesia.

While there are undoubtedly those who are allergic to the barbiturates, I have never observed an unfavorable reaction in a patient.

A child may have severe postoperative pain following removal of severely decayed and abscessed deciduous teeth. The pain is most severe immediately after reacting from the anesthetic. To prevent this, 16 mg. (¼ grain) codeine is given hypodermically while the child is under the anesthetic. This eliminates the discomfort of the needle prick while he is conscious, and also permits the sedation to work when it will do the most good. Codeine phosphate which is put up in a convenient 20 cc rubber diaphragm bottle is preferred. It contains 32 mg. (½ grain) of codeine phosphate in each cubic centimeter of solution.

If the child needs a prophylactic or therapeutic injection of penicillin, the best time to administer this is while he is under the anesthetic. This applies to injections of any other medication.

A little more care and thought devoted to the sedative and anesthetic problems of today's children will make better adult patients for tomorrow.—*1922 Tenth Avenue, South.*

A simplified method of thiopental anesthesia combined with intravenous meperidine

■ *Daniel Verne, D.D.S., Cleveland*

The advantages of intravenous thiopental sodium and nitrous oxide and oxygen anesthesia in the oral surgery office have been explained in detail by Bullard and Brockett,[1] Dunnom,[2] Everson,[3] Krogh[4] and others. It is unnecessary to repeat the original work of the men who pioneered in this field. Complications in the administration of thiopental sodium have been handled adequately by Bruce.[5]

It is the purpose of this paper to describe a method of intravenous thiopental sodium and nitrous oxide-oxygen anesthesia using intravenous meperidine hydrochloride (Demerol Hydrochloride) as an adjunct.

Meperidine is a white crystalline substance soluble in water as the hydrochloride salt. In addition to its narcotic properties, meperidine has an atropine-like effect in that dryness of the mucous membranes and a spasmolytic action on smooth muscles are produced.[6]

Brotman and Cullen[7] used meperidine as a supplementary drug during nitrous oxide anesthesia. The drug provided psychic sedation which compared favorably with morphine: depressed respiration and circulation less than comparable doses of morphine; had fewer undesirable side effects than morphine; had an atropine-like action which contrasted favorably with the effects of barbiturates and morphine. Meperidine also had a relatively short duration of its maximal depressant effect.

Premedication is as valuable in preparing the patient for intravenous anesthesia as it is for any other method of anesthesia. (1) It provides psychic sedation; (2) it permits more even and more rapid induction and smoother maintenance of anesthesia; (3) a smaller amount of the anesthetic agent is needed; (4) it helps to control the secretion of mucus.[8]

As the barbiturates are themselves strong respiratory depressants, it has been argued that the use of morphine and meperidine (which are potent depressors of respiration) increases the danger of overdepression of respiration. The aim is to administer doses which never unduly depress respiratory function.[8] It is the belief of Brown, Volpitto and Torpin that the dosage of meperidine should be in-

1. Bullard, Orlan K., and Brockett, Sheldon I., Combined Pentothal Sodium-Nitrous Oxide-Oxygen Anesthesia in Oral Surgery. *J. Oral Surg.* 3:138 (April) 1945.

2. Dunnom, Wayne R., Sodium Pentothal Anesthesia in Oral Surgical Office Procedures. Presented at Midwinter Meeting, Chicago Dental Society, 1950.

3. Everson, Stewart, An Evaluation of Nitrous Oxide and Pentothal Sodium Anesthesia in the Practice of Oral Surgery. *Oral Surg., Oral Med. & Oral Path.* 2:24 (Jan.) 1949.

4. Krogh, Harold W., Use of Thiopental Sodium in Dental Surgery. *J. Oral Surg.* 5:337 (Oct.) 1947.

5. Bruce, Ellsworth A., Complications in the Administration of Thiopental Sodium. *J. Oral Surg.* 7:292 (Oct.) 1949.

6. Yonkman, F. F., Noth, P. H., and Hecht, H. H., Demerol; A New Synthetic Analgetic Spasmolytic and Sedative Agent. *Ann. Int. Med.* 21:7 (July) 1944.

7. Brotman, Milton, and Cullen, Stuart C., Supplementation With Demerol During Nitrous Oxide Anesthesia. *Anesthesiology* 10:696 (Nov.) 1949.

8. Adams, R. Charles, *Intravenous Anesthesia.* New York. Paul B. Hoeber, Inc., 1944.

dividualized by using the intravenous route in preference to administration by subcutaneous or intramuscular routes.[9]

As less of the intravenous anesthetic is required after the use of preliminary medication optimal anesthesia is obtained without critical embarrassment of respiration. The matter thus becomes one of so-called balanced anesthesia, the effects being dependent on more than one drug. One advantage is a more even anesthesia which permits the performance of operative procedures with a minimal amount of the intravenous anesthetic.

■ *Report of Study*

For this study 180 cases were recorded. The patients were carefully scrutinized. Those patients who were poor anesthetic risks were placed in the hospital or a local anesthetic was administered in the office, supplemented by pentobarbital sodium and meperidine hydrochloride intravenously. A general anesthetic was not administered in the office to the following patients:

1. Patients having a history of coronary thrombosis, angina pectoris or cardiac decompensation.

2. Patients, requiring multiple extractions, whose physical stature would indicate a difficult anesthetic. One such patient is described here.

An obese man weighing 250 pounds was referred to have 22 teeth removed. He demanded that all the teeth be removed at one time under a general anesthetic. He had a "bull" neck and was florid in complexion. He gave a history of fighting another dentist under general anesthesia. He was willing to enter the hospital for one day. The 22 teeth were removed in the hospital under intravenous thiopental sodium, cyclopropane, nitrous oxide-oxygen, endotracheal anesthesia.

3. Pregnant women. It is felt that operative procedures for such patients should be handled in the hospital or performed under local anesthesia. No matter how carefully the general anesthetic is administered the oral surgeon runs the risk of causing premature delivery or of being accused of harming the fetus by poor administration of the anesthetic.

4. Patients with a known history of alcoholism.

5. Patients with difficult impactions or those requiring major oral surgery operations.

6. Patients suffering from asthma.

7. Patients with deep neck infections. Such patients are prone to develop respiratory obstruction under general anesthesia which is likely to prove fatal. In addition disturbances of the carotid sinus may cause anesthetic accidents.

8. Extremes of age. Elderly patients who are debilitated because of systemic conditions such as arteriosclerosis, hypertension, urinary dysfunction, and so forth, are poor risks. Children under the age of 16 are not given intravenous anesthesia in the office.

All the patients in this study were informed to bring another adult with them to the office. Nothing was allowed to be taken by mouth for at least six hours before the visit. The urinary bladder was emptied preoperatively.

A medical history is obtained on all patients and if necessary the patient's

9. Brown, John M., Volpitto, Perry P., and Torpin, Richard, Intravenous Demerol-Scopolamine Amnesia During Labor. *Anesthesiology*. 10:15 (Jan.) 1949.

physician is consulted. The patient is seated in the dental chair and then tipped back so that the body is in a horizontal position. In some instances the patient is placed in the Trendelenburg position.

An endotracheal setup which includes a laryngoscope, various sizes of endotracheal tubes and aspirating apparatus is always present. Curare, atropine sulfate, nasal airways and oral airways are a necessary part of the anesthetic armamentarium.

Several 20 cc. and 5 cc. syringes are kept in a sterile condition by autoclaving and then placing broken sterile needle hubs over the ends of the syringes. These hubs have had the hole in the end soldered.

One cubic centimeter of atropine sulfate is drawn into a 5 cc. syringe from a prepared bottle of atropine sulfate which contains 0.4 mg. of the drug per cubic centimeter. One cubic centimeter of meperidine hydrochloride is drawn into the same syringe from a prepared bottle which contains 50 mg. of the drug per cubic centimeter.

A tourniquet is placed on the arm and the solution is slowly injected into a suitable vein. A 20 gage needle is used. It should take at least three minutes to inject the solution.

After the solution is in the vein the patient may immediately feel its effects. The 5 cc. syringe is twisted off the needle and the patient is told to keep the arm in the same position on the arm of the chair. The 20 cc. syringe contains a previously prepared mixture of thiopental and water which contains 0.5 Gm. of thiopental. This 2.5 per cent solution is then attached to the needle in the arm and a test dose of 2 cc. is given. It is wise not to inject the thiopental too rapidly because meperidine and thiopental are respiratory depressants. Apnea will result if the anesthetic solution is forced on the patient. If apnea does occur artificial respiration is easly instituted with the anesthetic machine present. After the patient is breathing on his own again the thiopental can be continued.

When the patient has lost consciousness and the lash reflex has disappeared the nasal mask is placed and the nitrous oxide-oxygen is started. The oxygen percentage is always 20 per cent or more. The syringe and needle are withdrawn at this time. It is often desirable to inject 2 to 3 cc. more thiopental after starting the nitrous oxide-oxygen anesthetic. However, this will depend on the reactions of the patient and the situation at the time.

At the completion of the operation the patient is given a few breaths of 100 per cent oxygen and the mask is removed. In many instances the patient will awaken almost immediately after removal of the mask. The anesthetist should continue to watch for respiratory difficulty after the operation has been completed. The patient is placed in a recovery room and then allowed to leave the office if he is coherent, can walk and is accompanied by a reliable adult. However he must never be permitted to drive a car.

In this study of 180 patients, 109 were women and 71 were men. All of these patients received 0.4 mg. of atropine sulfate and 50 mg. of meperidine hydrochloride intravenously. The age group varied between 17 and 70. These patients were in good health. A certain number had minor disabilities. The pulse was

counted on all patients. The blood pressure was taken on only the doubtful patients.

In some instances it was necessary to supplement the general anesthetic with a local anesthetic. The patient may have started to cough and it was thought that he should be awakened before laryngospasm became evident. In some instances the local anesthetic was given if an immediate denture was being placed and the patient's cooperation was needed. If a patient was discovered to be an alcoholic after the operation had started he might be given a local anesthetic. In all instances where a local anesthetic was used as a supplementary agent the patient did not realize that the general anesthetic had been discontinued. The meperidine and thiopental had obtunded the psychic trauma as well as the pain stimulus. There were no instances of laryngospasm.

In the last 45 cases the anesthesia-operating times were recorded as well as the length of time the patient remained in the office postoperatively. The anesthesia-operating time was the number of minutes between the first injection and when the operation was completed. The average length of time was 11.3 minutes. The longest procedure lasted 22 minutes, the shortest 5 minutes. The average time a patient remained in the office postoperatively was 30.4 minutes. All the patients left the office in good condition. Some were still slightly confused but were able to leave with the aid of another individual. Some patients left the office with no apparent effects whatsoever.

The amount of thiopental never exceeded 20 cc.

■ *Conclusions*

The use of intravenous meperidine hydrochloride with thiopental sodium has many advantages:

1. The prevention of psychic trauma both preoperatively and postoperatively is paramount in the oral surgeon's office.
2. A more rapid induction is possible with smoother maintenance of anesthesia.
3. A smaller amount of thiopental sodium and nitrous oxide is necessary.
4. Mucus secretions are controlled more effectively because of the atropine-like action of meperidine hydrochloride, thus decreasing the incidence of laryngospasm.
5. The equipment necessary for this method is simple and minimal.
6. The patient leaves the office with little pain inasmuch as a narcotic has been delivered with the anesthetic.
7. There is never any need to decrease the oxygen below 20 per cent.—*2010 East One Hundred and Second Street.*

Cystic odontoma with interesting complications: *report of case*

■ *Sadi B. Fontaine, D.D.S., Oakland, Calif.*

While the cystic odontoma may be regarded as one of the least common of the odontogenic tumors, this case is being reported because of the interesting complications which were associated with the tumor.

The patient, a 14 year old white girl, was first seen on June 4, 1932. Her chief complaint was an acute, painful swelling on the right side of her face, which began two days previously.

PAST HISTORY—Her tonsils had been removed in 1921. In 1923 she fell on a sharp stick and injured the soft tissues of the face overlying the right mandible. This injury healed without complications. For a year prior to her present complaint she had increased lacrimation in her right eye which caused her sufficient distress to consult an ophthalmologist and an otolaryngologist. No clinical cause was found for the excessive flow of tears. No roentgenographic study was made at that time. The family history was negative.

EXAMINATION—The right side of the face was swollen and painful to palpation. The swelling extended from the infraorbital ridge to the angle of the mouth, and from the ala of the nose to the tragus of the ear. The nasolabial fold was obliterated. A large bulging mass with thin and crepitant walls filled the right maxillary vestibule. The deciduous right lateral incisor and cuspid teeth were still present. No clinical evidence could be seen of the maxillary permanent right lateral incisor and cuspid teeth. On the left the permanent lateral incisor and cuspid teeth had erupted.

Roentgenograms of the facial bones showed a large cystic odontoma filling the entire right maxillary sinus with expansion of the anterior wall (Fig. 1). In the cystic cavity was a complex odontoma. The permanent cuspid tooth was lying in the superior wall of the antrum; its crown had erupted within the floor of the orbit. Two teeth could be seen in the posterior chamber of the maxillary sinus. One of these teeth was the aberrant permanent lateral incisor.

The diagnosis of cystic odontoma with aberrant teeth was made. The lateral incisor and cuspid teeth had been displaced from their normal position in the dental arch by the expansion of the cyst.

The physical examination and laboratory findings were normal.

TREATMENT—The patient entered the hospital on June 8, for treatment. Under intranasal, insufflation ether anesthesia an intraoral incision was made through the mucoperiosteum overlying the tumor. The incision outlined the gingival crevices and extended from the right

central incisor to the right second molar. The soft tissues were raised from over the entire bulging area in the anterior wall of the maxillary sinus. A window was cut in the anterior wall sufficiently large to expose the outer sac of the cyst. The cyst was punctured and a large amount of purulent fluid was removed by aspiration. The cyst was completely enucleated, and when incised for inspection, a complex odontoma was found firmly attached within the sac.

The permanent cuspid tooth was found embedded in the superior wall of the maxillary sinus. The underlying bone was removed. The tooth was tipped towards the antral cavity with a thin bladed curet and removed with grasping forceps. On inspecting the bony bed from which the cuspid tooth was removed, it was noted that the cuspid crown had erupted into the floor of the orbit. This possibly was the cause of the lacrimal disturbance.

The lateral incisor was lying loose in the posterior chamber of the maxillary sinus and was readily removed. The flap was returned and sutured. A Penrose drain was inserted into the wound cavity through a stab incision high in the buccogingival fold.

On the first postoperative day the wound was irrigated through the Penrose drain with warm saline solution. The patient was comfortable and her condition was good. By the fourth postoperative day the swelling had greatly receded and the patient was dismissed from the hospital. Warm saline irrigations were repeated through the Penrose drain on alternate days. The drain was retained in the wound for

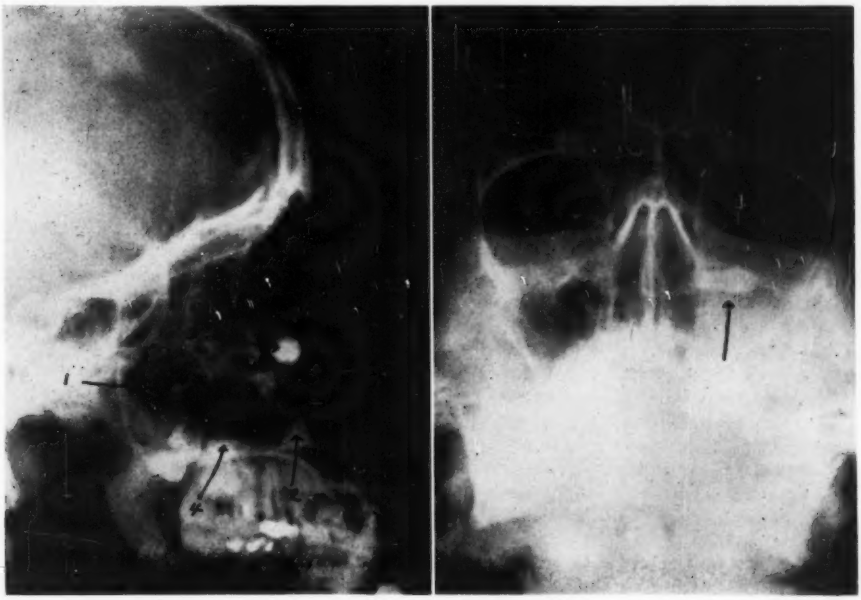


Fig. 1.—Left: Lateral view showing, 1, cystic expansion in maxillary sinus; 2, complex odontoma in floor of maxillary sinus; 3, permanent cuspid in the orbital floor; 4, permanent lateral incisor resting in front of the third molar tooth bud. Right: Posteroanterior view showing the permanent cuspid in a horizontal position in the floor of the orbit

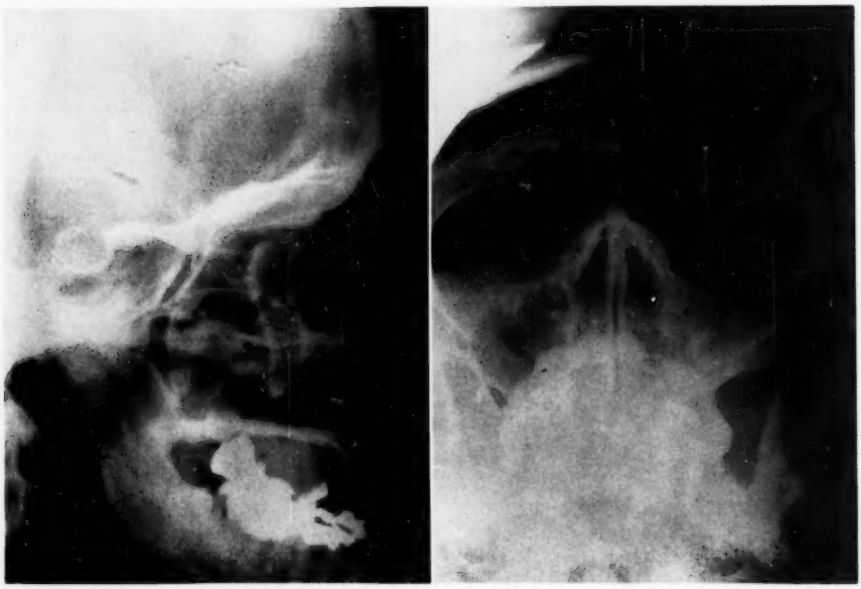


Fig. 2.—Lateral and posteroanterior views taken several years after treatment show good healing

two weeks and then it was removed.

A rhinologist saw the patient as soon as the drain was removed and provided drainage through the nose by making a nasoantral opening in the medial wall of the maxillary sinus. The rhinologist elected not to make the nasoantral opening at the time the tumor was removed because of the extreme thinness of the lateral and medial walls of the antral cavity. A two stage procedure was believed safer for the viability of such thin bone in the presence of infection.

Roentgenograms taken several years after treatment are shown in Figure 2.

COMMENTS—Here is a case where a cuspid tooth was really an "eye tooth." Undoubtedly it was carried there by the expanding cyst. The irritation the tooth produced in the orbital floor probably caused the increased lacrimation. A few days after the operation lacrimation was normal.

SUMMARY—A case of cystic odontoma with unusual complications has been reported. Interesting portions of the history and clinical findings have been described, and the surgical treatment is given in detail.—*1904 Franklin Street.*

Primary gingival syphilitic lesion: *report of case*

■ *A. D. Faier, D.D.S., Omaha, Neb.*

The dentist or oral surgeon must be vigilant at all times and think about the unusual possibilities which may present themselves.

The case presented here shows clearly the need for careful handling of patients and the need for differential diagnosis.

The literature bears out that primary lesions of syphilis are usually found extragenitally on the mucous membrane of the lips, on the oropharynx, tongue and tonsils.

Thoma[1] states that primary lesions in the oral cavity are rare. The primary lesion or chancre is usually found on the lip or tongue.

According to Stokes[2] "Chancre of the gum is regarded as a rarity and in all probability this rarity is genuine and not the product of lack of recognition."

It has been stated that "Extragenital chancres may be found on any part of the body, but the lip is one of the most frequent sites for extragenital infection. Chancres of the oral cavity are less common. The tongue is often involved while gingival chancre is rare. An important site for the primary lesion of syphilis is the tonsil and is often mistaken for diphtheria or Vincent's angina. Extragenital chancres of the fingers or the hands are especially important because owing to the low threshold of suspicion early diagnosis is scarcely ever made. Droplet infection from coughing by patients who have infectious oral lesions or the transfer of infectious material to the eye by a careless gesture are the principal modes of inoculation."[3]

The case presented here is of unusual interest because the primary lesion appeared on the gingiva. A search of the literature reveals a scarcity of reports of primary lesion of the gingiva.

REPORT OF CASE—A 19 year old white female came to the office on May 9, 1947. Above the upper left cuspid and bicuspid region there appeared an ulcerated area about 6 mm. in diameter. The ulcer was erosive in character with a greyish white membrane which bled when wiped with a cotton applicator. There was an area of inflammation surrounding this ulcer, which was cyanotic. This area was not particularly sensitive. A diagnosis was made of ulceromembranous stomatititis.

The patient was given penicillin troches, vitamin C and vitamin B complex. Local treatment in the office consisted of scaling, application of 5 per cent chromic acid packs in the interproximal spaces followed by peroxide wash. Hydrogen peroxide was recommended for home use. There was an improvement of local symptoms, but the ulcer over the left cuspid and bicuspid region persisted with no decrease in size.

On May 19 the patient returned with an enlargement of the left submaxillary gland. It was moderately prominent with no tenderness. The patient was referred to her family physician for examination. The report was negative.

The patient was referred to a specialist in diagnosis and internal medicine. He reported that for the past few months the patient had been going with a boy who later admitted he was being treated for syphilis. The physical examination was negative except for a macular erythematous eruption on the chest, abdomen and upper back. Also noted were enucleated

1. Thoma, Kurt H., *Oral Pathology*, ed. 2. St. Louis: C. V. Mosby Company, 1944.

2. Stokes, John H., *Modern Clinical Syphilology*, ed. 3. Philadelphia: W. B. Saunders Co., 1948.

3. Becker, S. William, and Obermayer, M., *Modern Dermatology and Syphilology*, ed. 2. Philadelphia: J. B. Lippincott Co., 1947.

tonsils, mucoid exudate over the tonsillar fauces and general redness of the gingivae. The left submandibular nodes were large and tender. The lateral cervical nodes and bilateral axillary nodes were small.

A Kahn test on May 24 was positive. Gingival smears were negative for Vincent's organisms. A dark field examination was positive for *Treponema pallidum*.

The Kahn test two days later was still positive.

The patient was put on a course of penicillin, Mapharsen and bismuth salicylate in oil from May 29 to September 29.

SUMMARY—This case shows why the dentist should be suspicious of lesions that resist treatment, particularly those that show involvement of the soft tissue with adenopathy without tenderness. The dentist should refer patients to a competent physician to confirm a diagnosis.—*1102 Medical Arts Building.*

Metastasis of neuroblastoma to the mandible: *report of case*

■ *Richard J. Burch, D.D.S., Battle Creek, Mich.*

A 4 year old white boy was admitted to Percy Jones Army Hospital on February 13, 1950. He was apparently well until two months before examination when the mother noticed loss of appetite and failure to gain weight. The child also had had episodes of abdominal pain, nausea and vomiting. He had no injuries or serious illness.

General physical examination was normal except the abdomen. In the upper left quadrant there was a palpable firm somewhat nodular mass. There was a definite dullness to percussion and the mass did not move with respiration. The spleen was palpable.

The laboratory examination revealed: urine normal; white blood count 6,800, neutrophils 38, lymphocytes 56, monocytes 6; red blood count 3,890,000; hemoglobin 61 per cent per 9.6 Gm., with anisocytosis and poikilocytosis, polychromia and hypochromia. Ten per cent of the cells of the nongranulocytic series resembled those found in infectious mononucleosis.

Roentgenographic examination of the abdomen was inconclusive and negative of all the long bones.

On February 21, the patient complained of pain in the right jaw and oral surgery consultation was requested. There was a slight elevation of the tissue in the oral mucobuccal fold along the right mandible. The tissue tone was normal except a small area which apparently was traumatized. Palpation revealed a firm tender mass on both the medial and lateral aspects of the body of the right mandible. Regional superficial cervical lymph nodes were palpable. Roentgenographic examination re-

Lieutenant Colonel, U. S. Army Air Force, now on active duty. Formerly chief of oral surgery, Percy Jones Army Hospital, Battle Creek, Mich.

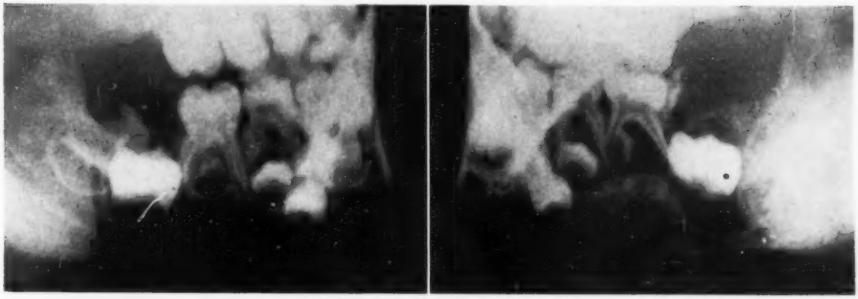


Fig. 1.—Medullary disturbance of the right side of the mandible

vealed an apparent medullary disturbance of the right mandible (Fig. 1).

On February 24, an exploratory laparotomy, with biopsy of the retroperitoneal tumor, right cervical and left inguinal nodes, confirmed the diagnosis of neuroblastoma. No tumor was found in the cervical nodes.

The patient was given repeated transfusions and over a 13 day period 100 roentgen units daily was given to the mandibular mass using 200 kv., 8 by 10 cm. field, target skin distance 50 cm. through 0.5 mm. copper and 1 mm. aluminum filters. Following roentgen therapy to the abdomen and mandible, the pain in the mandible ceased. However the course was downhill and the patient died on April 24.

At autopsy the right mandible was sectioned from an oral approach and the gross tumor mass of the mandible was removed (Fig. 2). The tumor mass was covered with bone and at no point appeared to have involved the soft tissues. The inferior dental nerve may be seen entering the canal just distal to the mass in Figure 2, right.

The primary site of the tumor was a widespread necrotic and hemorrhagic mass envelop-

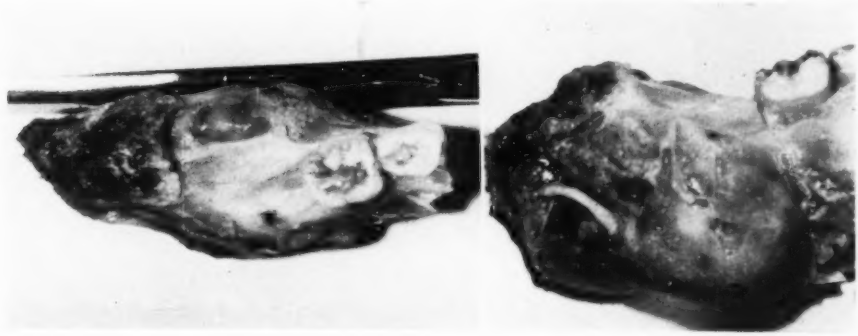


Fig. 2.—Two views of the tumor mass removed from the mandible. It was covered with bone, and did not involve the soft tissues

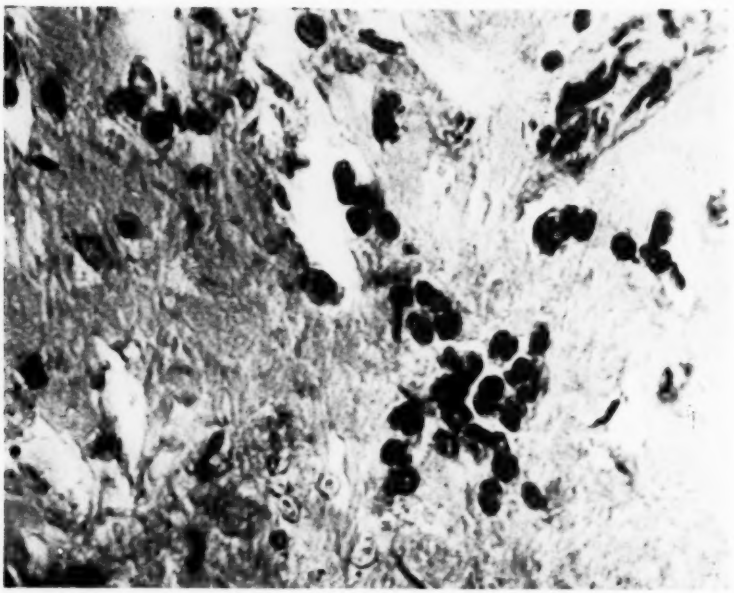


Fig. 3.—Only occasional tumor cells were found in the section of the mandibular mass. It was almost completely reduced to dense fibroid tissue by roentgen therapy

ing and displacing the pancreas. The adrenal glands were not involved. Metastasis to the liver was extensive.

Only occasional tumor cells were found in the section of the mandibular mass, as shown in Figure 3. The tumor mass was almost completely reduced to dense fibroid tissue by roentgen therapy. Metastasis of tumors to the mandible are few. When found early, neuroblastomas generally respond favorably to radiation therapy.

Pain was alleviated and the tumor mass of the mandible essentially sterilized by radiation therapy.

■ A Specialist

The definition of a specialist as one who "knows more and more about less and less" is good and true. Its truth makes essential that the specialist, to do efficient work, must have some association with others who, taken altogether, represent the whole of which the specialty is only a part.—*C. H. Mayo, "Surgery's Problems as They Affect the Hospital," Modern Hospital 51:68, September, 1938.*

Hemangioendothelioma of the tongue: *report of case*

■ *Irwin Lighterman, D.D.S., New York*

The following report is of interest because no report of hemangioendothelioma of the tongue was found recorded in a study of the literature.

Vascular tumors may be divided into two groups: (1) vasoformative tumors which are characterized by the formation of new blood vessels or cavernous spaces; (2) tumors which are formed from the cells of the adventitia, media and intima. In the first group may be listed the hemangioma, a benign tumor of blood vessels, and the hemangiosarcoma which is the malignant counterpart of the hemangioma. The second group includes the hemangiopericytoma derived from the adventitia, the leiomyosarcoma and benign vascular leiomyoma derived from the media and the hemangioendothelioma derived from the intima of the blood vessels.[1]

Hemangioendothelioma is the most common of the tumors formed from the component parts of the blood vessels. The little consideration given this tumor in textbooks and the paucity of case reports in the literature may indicate that it is nevertheless of rare occurrence.

Hemangioendotheliomas occur at any age but are most commonly seen in childhood or in youth. Carr[2] reported the case of a seven week old infant who died. The lesion's primary locale may be seen wherever blood vessels are found and the sex incidence is about equal. The tumor has tendencies to infiltrate and may be of rapid or slow growth. It does not always give the appearance of a vascular tumor. Bernier[3] stated that hemangioendotheliomas may vary in color from a subdued bluish red to completely colorless. Histologically the tumor may resemble a hemangioma in parts because of the formation of vascular channels. The diagnostic characteristic, however, is an overwhelming endothelial proliferation.[3] Stout[1] stated that a positive diagnosis is determined by two histologic features—an overproduction of endothelial cells and the formation of vascular tubes by these cells with a delicate framework of reticulin fibers.

Stout,[1] Kastl[4] and Ackerman and del Regato[5] believe that the tumor is malignant because metastasis was reported in a high percentage of cases. On the other hand Willis[6] believes that the hemangioendothelioma is a benign growth that does not metastasize but exhibits multifocal tendencies. Thoma[7] states that the tumor is potentially malignant, that it develops slowly and is likely to metastasize only after protracted irritation. Ewing[8] believes that the tumor exhibits local malignancy but that its most constant characteristic is multiplicity.

A somewhat obese white female, aged 60, was seen on February 16, 1950. Her chief complaint was a growth upon the tongue which worried her because of its rapid enlargement. She first noticed the growth on January 15, 1950, two days following an abdominal operation. On that date the growth was the size of a pin head, and was attributed to irritation caused by a full lower denture. A medical intern con-

From the department of oral surgery, the Hospital for Joint Diseases, New York.

1. Stout, A. P., Hemangio-endothelioma: A Tumor of Blood Vessels Featuring Vascular Endothelial Cells. *Ann. Surg.* 118:445 (Sept.) 1943.

2. Carr, M. W., Congenital Bilateral Hemangio-endothelioma. *J. Oral Surg.* 6:341 (Oct.) 1948.

3. Bernier, J. L., *A Manual for the Differential Diagnosis of Oral Lesions*. St. Louis: The C. V. Mosby Company, 1942.

4. Kastl, W. H., Hemangio-endothelioma With Diffuse Involvement of Spleen and Bone. *Ann. Surg.* 133:561 (April) 1951.

5. Ackerman, Lauren, and del Regato, A. J., *Cancer*. St. Louis: The C. V. Mosby Company, 1947.

6. Willis, R. A., *Pathology of Tumours*. St. Louis: The C. V. Mosby Company, 1948.

7. Thoma, Kurt, *Oral Pathology*, ed. 3. St. Louis: The C. V. Mosby Company, 1950.

8. Ewing, James, *Neoplastic Diseases*, ed. 3. Philadelphia: W. B. Saunders Company, 1931.

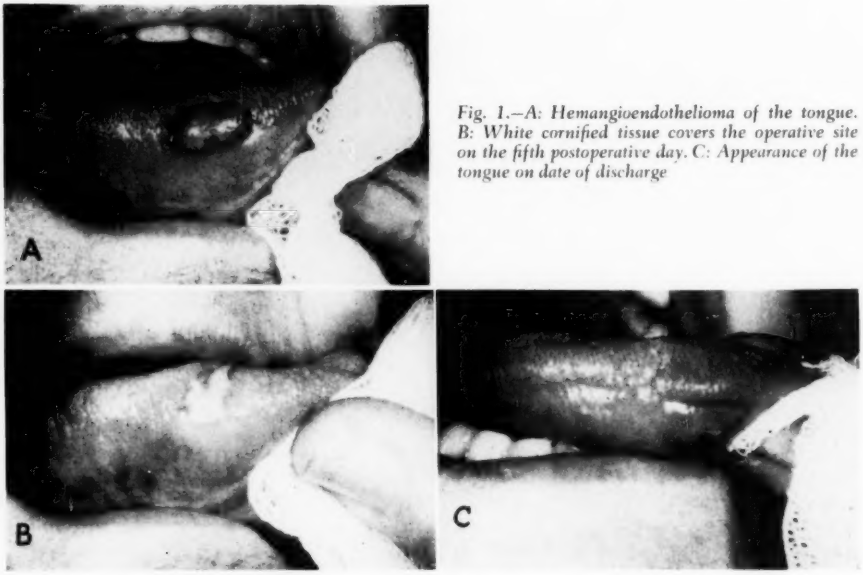


Fig. 1.—A: Hemangioendothelioma of the tongue. B: White cornified tissue covers the operative site on the fifth postoperative day. C: Appearance of the tongue on date of discharge

sulted at that time simply advised saline irrigations.

Systemic and family histories were essentially noncontributory. The patient had several abdominal and pelvic operations.

Examination revealed nothing of consequence to be noted; the cervical lymph nodes were not palpable. With the exception of the lesion upon the tongue the oral tissues were normal. The jaws were edentulous and the pa-

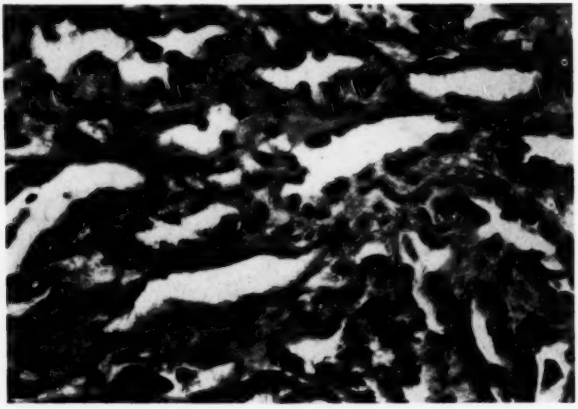


Fig. 2.—Anastomosing vascular channels lined by atypical hyperchromic endothelial cells, one or more layers in depth. X 430

tient was wearing two well fitting dentures.

A sessile yellowish white tumor about 0.5 by 0.5 by 0.75 cm. could be seen on the right lateral border of the tongue (Fig. 1, *A*). The lesion was painless although it appeared to be irritated by the dentures. Clinical diagnosis was uncertain because of the rapid enlargement of the growth. However, aside from its rapid enlargement the growth resembled a papilloma or fibroma.

On February 16, 1950, procaine and epinephrine was injected to anesthetize the right inferior alveolar and lingual nerves. This injection was supplemented with local infiltration to effect hemostasis and to insure adequate anesthesia. The growth was removed completely, but not radically, and the specimen was sent to the pathology laboratory. The wound was closed with interrupted sutures.

Postoperative sedation was prescribed and home care was outlined with specific emphasis on refraining from the use of the dentures temporarily. Healing was uneventful (Fig. 1, *B*), and the patient was discharged February 28, 1950, to return for periodic observation (Fig. 1, *C*).

The gross specimen consisted of several fragments of mucous membrane. On one of the fragments was a small smooth surfaced round papilloma. Microscopic examination revealed many vessel spaces lined with endothelial cells (Fig. 2). The vessels showed branching and anastomosis. The diagnosis was hemangioendothelioma of the tongue.

The patient was seen periodically for 24 months. There was no local recurrence or evidence of metastasis. It is notable that although rapid growth is considered a feature of malignancy, simple excision apparently terminated this growth.—*90 Riverside Drive.*

■ The Dentist's Interest in Anesthesia

The dentist's interest in anesthesia is a very natural one indeed. Relief from pain is not more urgent in any field of medicine or surgery than it is in dentistry. While some dentists find general anesthesia indicated only occasionally in their practice, there are those specialists in oral surgery who find that general anesthesia is a constant need. The propinquity between these two needs has made these surgeons have more than a passing interest in the subject of anesthesiology. It should be emphasized that the qualities which make for a fine oral surgeon do not necessarily apply to the qualities required for an excellent anesthetist. It is for this reason that it is necessary in some instances to make some adjustments. It is not unheard of for an oral surgeon to become more famous and more proficient as an anesthetist than as an oral surgeon. Theoretically at least, if not always practically, the secondary training in anesthesia which an oral surgeon is subjected to can be adequate as his "first love"—dentistry. One of the pitfalls in the training of oral surgeons in anesthesia . . . is that he is likely to treat this field in somewhat the same way as his manipulative work in dentistry—he learns a technic. Consequently, he must be made aware of the fact that the basic psychologic needs of the patient are vastly different when undergoing anesthesia from those when undergoing ordinary manipulative work in the mouth.—*Bernard B. Raginsky, "Some Psychosomatic Aspects of General Anesthesia," Anesthesiology 11:402, July, 1950.*

Cardiac arrest

METHODS AND TECHNICS of cardiac resuscitation have been the subject of considerable research and discussion throughout the world, particularly during the past two years. We have long maintained that any surgeon or anesthetist, who is willing to administer an anesthetic or who assumes direct responsibility for the administration of an anesthetic, should be capable of meeting any anesthetic emergency.

In the past this was felt to be primarily a problem associated with the respiratory tract and to a lesser degree with the circulatory system. A knowledge of resuscitation by means of artificial respiration, emergency intubation or tracheotomy, in addition to the administration of various cardiac and respiratory stimulants, was thought adequate to cover the usual anesthetic or surgical emergency. This is no longer true. During the past five years the problem of cardiac arrest has been recognized and studied in our larger medical research centers.

Cardiac arrest may occur under any anesthetic and during any major or minor surgical procedure. Inasmuch as many oral surgeons are directly responsible for the administration of anesthetics during the course of oral surgical procedures, it is advisable for them to become acquainted with the causes and diagnosis and the methods of management of this catastrophe.

It has been estimated that the condition of cardiac arrest will occur from three to five times a year on any active teaching hospital surgical service. It seems that this is a conservative estimate, and a review of the causes of surgical deaths in large institutions indicates that a higher incidence does occur.

It is imperative that immediate action be taken when this emergency presents itself, as the restoration of the flow of oxygen in the blood to the brain within a period of three to four minutes is essential. If the life of the patient is to be saved, the surgeon must act

at once. The responsibility of diagnosis and treatment immediately becomes his. There will not be time to call in a consultant. For that reason the surgeon, who assumes the responsibility for patients undergoing surgery under general anesthesia, should acquaint himself with the methods of cardiac resuscitation and be able to carry out such measures.

Cardiac resuscitation is used to the best advantage and has the most favorable outcome when arrest is caused by an overdose of anesthetic in patients with a normal heart, or when it occurs without any demonstrable lesion, anoxia or overdose of anesthetic agent. When cardiac arrest or ventricular fibrillation is incidental to anoxia, serious heart and brain damage occur in all probability before the heart action has ceased. This means that the period of arrested circulation that can be tolerated is decreased accordingly.

Drs. Julian Johnson and Charles K. Kirby of the University of Pennsylvania, in the *Journal of the Mount Sinai Hospital* (September-October, 1951, page 141) discuss their experience in 20 cases of cardiac arrest with favorable outcome in 8 cases. They state that absence of pulse or blood pressure immediately should suggest cardiac arrest. The only quick and reliable way to diagnose cardiac arrest is to see or feel a large artery. If the operative site does not afford this opportunity, which it rarely would in oral surgical cases, the authors recommend immediate opening of the chest to feel the heart as a diagnostic procedure. This eliminates the fatal delay of other procedures less reliable.

If the absence of pulse or blood pressure is noticed, it is imperative to act with speed if resuscitation is to be successful. These writers feel that if a surgeon is not able to palpate the heart or large vessel directly, the opening of the chest should be a diagnostic procedure. Auscultation probably will not be helpful and inspection of the retinal arteries with the ophthalmoscope is not of practical value. Neither is the absence of capillary refill a reliable indication. "The surgeon needs only a pair of gloves and a scalpel. Given these, he should have his hand on the heart within ten to fifteen seconds. Skin antiseptics and sterile drapes are refinements which can be added when available, but their absence should not cost the patient his life."

The incision is made in the fourth interspace from the edge of the sternum to the midaxillary line, quickly through the chest wall and pleura. This should be done very carefully for fear of cutting into the lung or heart. Rib spreaders or retractors are inserted and the hand is passed between the fourth and fifth ribs. The pericardium should be incised from the base to the apex anterior to the phrenic nerve. In cardiac arrest, the heart will be still; if the heart is in ventricular fibrillation, it will feel like "a bag of worms." Respiration should be maintained by manual compression of the rebreathing bag of the anesthesia machine. This requires a tight-fitting face mask or preferably an endo-

tracheal tube and 100 per cent oxygen. Mouth to mouth technic can be employed if the usual equipment is not available.

If the heart is in arrest, the surgeon begins rhythmic compression. Massage is done by compressing the heart in the thumb and fingers rapidly, up to 120 times per minute. This should produce a peripheral pulse if properly done. This rate, however, cannot be maintained long because of the fatigue of the operator. He should be relieved as frequently as necessary, and if blood or plasma is available it should be given intravenously as soon as possible to replace the lost blood volume and to permit adequate filling of the heart. Two or three cubic centimeters of epinephrine 1:10,000, or two to four cubic centimers calcium chloride 10 per cent injected into the heart may be useful in producing increased tone of cardiac muscle, but epinephrine in standard concentration increases the probability of ventricular fibrillation. If ventricular fibrillation is present, procaine may cause a reversion to normal rhythm. In most cases, however, electric shock therapy has been most useful in defibrillating the heart muscle after procaine injection.

Speed is essential for success in the resuscitation of the arrested myocardium. It is felt by most observers that unless the circulation is reestablished within a period of three to five minutes, the central nervous system will suffer irreversible changes from anoxia that will result in degenerative psychologic and physiologic changes even though the patient may survive the initial shock to the circulatory system.

It becomes imperative that the anesthetist and surgeon acquaint themselves with the etiology and management of this most recently recognized anesthetic and surgical complication and that the surgeon be thoroughly capable of carrying out the necessary procedures.—*Reed O. Dingman.*

■ Root Fracture in Premature Removal of Deciduous Teeth

Q.—If deciduous teeth with full roots must be prematurely removed and the fine root apexes fracture, what is the proper procedure?—*G. S., New York.*

A.—When the fractured root tip is small, deeply located, and in contact with the developing permanent tooth, removing it may do more harm than good. Such apexes may be resorbed as the permanent tooth erupts, or if persistent, may be removed at a more superficial level at a later date. The chief complication caused by these residual tips is alteration of the succedaneous tooth to an abnormal position. When fractured roots of deciduous teeth are large, accessible, or simply dislodged, they obviously should be removed immediately.

■ Impacted Upper Cuspids in the Older Child

Q.—How should the problem of unerupted and impacted upper cuspids be handled in the older child?—*J. T. H., Charleston, W. Va.*

A.—The best preventive measure to avoid impacted maxillary cuspids is through routine roentgenographic observation to check on the resorption of the deciduous cuspid root. Whenever these deciduous roots are not resorbing normally the tooth should be extracted to prevent deflection of the permanent tooth. Delayed exfoliation of the deciduous cuspid is the principal etiologic factor in producing the impaction.

In a later stage when the retarded upper cuspid has already been deflected to the palate area, careful and complete surgical exposure of the crown will promote eruption and facilitate later orthodontic management.

■ Ameloblastic Odontoma: Case Report Critically Analyzed

Letter to the Editor.—Free discussion is necessary for the promotion of knowledge. Disagreement with others' views and diagnoses is healthy and such disagreement should be taken with friendliness and candor. No editor should disallow controversy, within gentlemanly reason, in the pages of his magazine. Good controversy is stimulating and both sides should accept criticism without rancor. Because we are motivated by this philosophy, we are sending this letter.

We do not agree with either the diagnosis or the comment in the case reported as "ameloblastic odontoma" by the Doctors Blake in the July, 1951, issue of the JOURNAL OF ORAL SURGERY. At the time the paper had been submitted for publication one of us (L.R.C.) sent in a separate discussion which we thought would be used in the comment on this case. For the sake of the record we are again including this discussion.

"Microscopic Findings—The specimen is composed of two types of embryonal odontogenic tissue, mesenchymal and ectodermal. The mesenchymal structure, which is identical with the dental papilla, serves as a matrix for the ameloblasts. The latter cells are in strands, interlacing columns with burgeoning ends, and in clusters. Stellate reticulum, which is nothing more or less than intercellular edema existing in a solid group of cells, is scarce. A few isolated regions show this change. One in particular is of interest. Here the picture is not unlike that of a developing tooth. There is a long strand of epithelium that can be likened to the oral epithelium and coming from this is another strand similar to the dental lamina which in turn gives rise to two tooth buds, somewhat distorted, but still significantly recognizable.

The ameloblasts appear to be perfectly normal and there is no transformation anywhere to squamous epithelium, so often found in the true ameloblastoma.

"DIAGNOSIS—This, in my opinion, is a soft odontoma, or to use the newer phraseology, mixed odontogenic tumor. It is true that there is a great deal of epithelium present, but this may signify the fact that this lesion represents the tooth germs of many teeth. If allowed to remain, the odontogenic cells may have gone on to produce dentin, cementum, enamel and perhaps dozens of small malformed and even perfectly formed teeth, the so-called composite odontoma. The only difference between the soft odontoma and the composite odontoma is one of age and maturation. The former represents the stage when only the cells are present, which will form the calcified structures seen in the later stage.

"Such a tumor, if operated upon, should be completely removed, though conservatively, and after removal the patient should be under constant watch for possible recurrence because we do not know when and how such embryonal epithelium may take on growth potentialities or malignant change.—*Lester R. Cahn, New York.*"

This opinion was not printed. That of other authorities was implied. An editor should have an open mind, particularly the editor of a scientific journal. Whether he agrees or not is beside the point. The case must rest on its merits and right will prevail through the preponderance of evidence.

There is no justification for the term "ameloblastic odontoma" as Colonel Bernier stated in one of his opinions. It is as justified in this case to say "myxomatous odontoma," for both ectodermic and mesodermic elements are present. In fact, the latter predominates. There is no evidence that the epithelial cells are ameloblasts. Because they look like ameloblasts does not make them so. As Willis states, we are frequently guilty of "falling into the time honoured error of construing resemblance as identity." All that we can say is that these cells are epithelial remnants of the oral ectoderm. The term "ameloblastic" is a sinister adjective and would give license, in the view of some surgeons, to perform a needlessly radical operation.

We cannot agree with Dr. Kerr when he says, "There is no hard tissue to base a diagnosis of odontoma." It is our belief that an odontoma is a lesion composed of odontogenic cells. As was stated above, the appearance of hard tissue is only a condition of maturation of the lesion.

All that is justifiable to conclude about this lesion is that it is an odontoma, or a mixed odontogenic tumor—an aberration in dental development.

We should therefore ask in all fairness to scientific progress, that this letter be given some prominence in your journal.—*Lester R. Cahn and Theodore Blum, New York.*

■ ABSCESSED TOOTH OF PATIENT WITH HODGKIN'S DISEASE

Q.—A patient with Hodgkin's disease who has been treated with roentgen ray and nitrogen mustards has been sent to me for extraction of a chronically abscessed tooth. What precautions are necessary?—*J.P.C., San Francisco.*

A.—Although tooth extraction is insignificant in the shadow of the poor prognosis in this disease, it may bring on complications which increase the morbidity of the patient's course. The significant hazards in this situation are a tendency to bleeding and low resistance to infection, due both to the disease and the therapy. Pre-extraction blood studies, including bleeding and clotting time, combined with supportive care and generous use of antibiotics, will avoid the pitfalls in such a case.

■ NITROUS OXIDE-OXYGEN ANESTHESIA. F. W. Clement. Third edition. 369 pages with 129 illustrations. Index. Price $6.50. Philadelphia: Lea & Febiger, 1951.

Earlier editions of this book dealt largely with the methods devised and taught by the late Dr. E. I. McKesson. The text of this edition has been enlarged and contains 80 more pages and 37 more illustrations than does the second edition. The properties of nitrous oxide and its physiologic effect when given to produce general anesthesia, either by itself or with the various adjuncts, is clearly described. The effectiveness of continuous and of intermittent flow machines designed for the administration of nitrous oxide-oxygen anesthesia, is reviewed critically. The methods of administering nitrous oxide-oxygen anethesia are described, as well as the use of various adjuncts. Considerable space is given to methods of placing the tube for endotracheal anesthesia. There is a chapter which discusses common misconceptions of the use of nitrous oxide-oxygen anesthesia. Part 5 of the book deals with dental anesthesia and analgesia. In this, the third edition of his book, Dr. Clement presents a straightforward discussion of the place nitrous oxide-oxygen holds in modern anesthesia.—*Warren R. Schram.*

■ CURRENT THERAPY 1951: LATEST APPROVED METHODS OF TREATMENT FOR THE PRACTICING PHYSICIAN. Edited by Howard F. Conn. 699 pages. Price $10. Philadelphia: W. B. Saunders Co., 1951.

This 1951 edition of *Current Therapy* presents the latest approved methods of treatment as practiced by the 275 contributors, consulting editors and editor of the text. The methods presented are the current regimen of treatment used by the author of each section and do not imply that the named author was the originator of the particular therapy. Many of the methods given in the 1950 edition have been significantly changed, and the 86 new methods are presented. All material for this text was reviewed just before publication to insure the inclusion of any new standard methods. As in previous issues, diagnosis is not discussed unless it is an integral part of the therapy. The brief discussions of the therapeutic measures avoid extraneous material, yet present in exact detail all the measures necessary for the proper management of the illness.

Section 1 covers infectious diseases. Included is the care of Vincent's angina and gingivitis with detailed description of systemic and dental management. Recent changes and additions to antibiotic therapy are given.

The therapy of diseases of the respiratory system is presented in section 2. Section 3 covers diseases of the cardiovascular system. In the discussion of subacute bacterial endocarditis, the danger of dental extractions in individuals with minimal evidences of valvular heart disease is stressed. Section 4, therapy of diseases of the blood and spleen, includes methods of treatment for agranulocytosis and hemophilia. The dentist will find the dental technic used for patients with hemophilia of interest and practical importance.

Diseases and tumors of the digestive system are covered in section 5. The management of diseases of metabolism and nutrition is presented in section 6. Section 7 gives the methods of treatment of diseases of the endocrine system. The numerous anomalies, infections, and tumors of the urogenital tract are discussed in section 8. Section 9 covers the treatment of venereal diseases. Section 10, allergic diseases,

includes a discussion of antihistaminics in the treatment of allergies.

The treatment of about 50 diseases of the skin is presented at length in section 11. Of interest to the dentist and the oral surgeon is the discussion of leukoplakia buccalis, lichen planus, pemphigus, actinomycosis and erythema multiforme. Precancerous lesions of the mucous membrane and skin are discussed.

Section 12, diseases of the nervous system, includes many conditions of importance to the dentist such as trigeminal neuralgia, glossopharyngeal neuralgia, Bell's palsy and headache. Section 13 covers diseases of the locomotor system which includes hypertrophic arthritis, rheumatoid arthritis, bursitis, fibrositis and rheumatism.

The therapy of obstetric and gynecologic conditions is covered thoroughly in section 14. Section 15 covers the treatment of diseases caused by physical and chemical agents, including burns, barbiturate and mercury poisoning and poisoning from snake and spider bites. Section 16 includes a roster of drugs, giving additional data on the drugs mentioned in this volume and dosage tables. The index is complete in every particular.

Current Therapy 1951 is an unusually well arranged and easily read text. The format is excellent. The large number of outstanding contributors, together with its consultative staff, assures the reader reliable, up-to-date, specific information on the treatment of all important diseases and conditions. The details of nursing care, diet and other adjuvant therapy are fully presented.—*Carl W. Waldron.*

■ PHYSIOLOGY AND ANATOMY. Esther M. Greisheimer. Sixth edition, 842 pages, with 478 illustrations, 52 in color. Index. Price $4. Philadelphia: J. B. Lippincott Co., 1950.

This book contains a large amount of anatomy, a fair amount of physiology and a sprinkling of pathology and embryology. It is only the part dealing with physiology that the reviewer considers in this article.

Physiology is a most complex study. The functions of the various organs are so interrelated that, in writing a text for beginners, an author frequently would like to say four or five things at the same time, if this were possible. In consequence, careful planning as to the sequence of the material to be presented is necessary. In this, the reviewer feels, the author has not always succeeded. For example, in the first chapter, entitled "Introduction to Anatomy," a detailed description of the structure of the skin is given and two pages are devoted to its functions as an organ of excretion, absorption, temperature regulation and protection. This material is presented before the student is made acquainted, in Chapter 2, "Introduction to Physiology," with the elementary functions of the body. In discussing the formation of tissue fluid (page 388) the terms blood pressure and vasomotion are unavoidably used, but their meaning is not revealed until pages 475 and 490.

Of equal importance with sequence is the selection of suitable material from an almost unlimited supply. What is to be included and what should be excluded must be governed largely by the class of readers for whom the author is writing and his objective in writing.

The author has not stinted in giving facts. Indeed the statements of facts follow each other with such rapidity, it is sometimes difficult to keep up with the procession. To the reviewer it seems a more careful selection, both as to inclusion and exclusion, could have been made.

Too great brevity in many instances destroys the value of the information imparted. It must be difficult for a beginner to grasp, from a mere six-line text and two extremely brief schematic formulas, the importance of amino acids as building stones of the protein molecule and to understand the part played by them in protein metabolism. What a calorimeter looks like and how it operates is left to the imagination. The lessening of surface tension as an aid in fat digestion is mentioned (page 619); but from neither the glossary, index or text was the reviewer able to learn what this term means. This also holds for stenosis (page 466).

Most of the illustrations are found in the anatomy sections and are excellent. Some in the physiology sections, such as those showing

the control of digestive secretions and the three diagrams illustrating, respectively, carbohydrate, fat and protein metabolism, are helpful. Some illustrations may be too complicated for beginners (Fig. 225, 309, 313, 346) and might have been omitted without detracting from the value of the book. Sharply differing from nearly all other textbooks, the results of vitamin deficiencies are left unillustrated.

The chapters on endocrines and on the reproductive system are excellent, both as to text and illustrations. The book contains a wealth of information and as a book of reference may prove useful.

A list of reference books, glossary and index are included.—*W. D. Zoethout.*

■ Technique Chirurgicale Stomatologique. Chompret, Dechaume and Richard. Third edition. 365 pages with 206 illustrations. Index. Price 1,650 francs. Paris, France: Masson & Cie., 1951.

This book, the third volume of *La Pratique Stomatologique*, is one of the latest on oral surgery published in France. In the introduction the authors state that they hope to provide the student as well as the general practitioner with a practical guide. However, they attempt to view technic in the broader perspective of science.

Part 1 gives a brief description of the anatomy of the maxillofacial region. Part 2 is a short enumeration of the requirements for the operating room. Part 3 is devoted to preoperative and postoperative care and the treatment of possible complications. Part 4 deals with general, regional and local anesthetics with a brief discussion on indications for use, advantages and disadvantages of each. Part 5 describes the technic of extraction with special emphasis on removal of third molars, infected teeth and roots. The need for special care when dealing with children is also discussed. The prevention and treatment of accidents and complications therefrom are covered in Parts 4 and 5.

Part 6 describes surgical intervention on the bones of the jaw: extraction of impacted teeth and apicoectomy. A brief chapter on tooth implantation, the treatment of cysts, tumors, fractures, osteitis and necrosis, sinusitis in connection with tooth infection, and temporomandibular joint diseases is included. Surgical treatment of various diseases of the soft tissues (infections, cysts, tumors and fistulas) is covered in Part 7. A short chapter describes biopsy technic.

The correction of congenital and acquired deformities, such as surgical preparation for prosthetic appliances, closing of fistulas between the mouth and sinus, treatment of skin fistulas and wounds of the face and ugly scars are included in Part 8. The book closes with a short review of first aid in extensive mutilations of the maxillofacial region, the accepted principles of treatment and restoration by plastic surgery.

This book is not a complete guide for oral surgery. It gives, rather, a review of the possibilities and the most important steps in various interventions in oral surgery. The minor operations are more fully described. It is written in a clear and simple manner.—*Georges A. Feys.*

■ Clinical Laboratory Methods. W. E. Bray. Fourth edition. 614 pages with 119 illustrations, 18 in color. Index. Price $7.25. St. Louis: The C. V. Mosby Company, 1951.

For some years Dr. Bray has been teaching clinical diagnosis to medical students and has been supervising clinical laboratory technicians. He, therefore, has been in a position to select and arrange material, with emphasis on methodology, which would aid the physician in solving clinical problems, using selected laboratory procedures.

The present edition is evidence of the usefulness that *Clinical Laboratory Methods* has achieved. The new edition discusses Watson's method for determining urobilinogen in the urine and feces, hormone assay, sodium bisulfite method for sickling of red cells, results of heparin and dicumarol studies, the diagnosis of hemoglobinuria and the Coomb's test, as well as the new nomenclature of blood cells.

The author includes on a separate page the nomenclature adopted by the committee on hematology of the American Society of Clinical Pathologists and affiliated organizations, but the new terminology does not appear in all of the sections on hematology. In fact, there is still the old spelling, *eosinophile* and *leucocyte*, instead of *eosinophil* and *leukocyte*.

References to the sources from which the material is obtained are an added feature. There are some references which appear at the end of the chapter, others appear at the end of a discussion of the subject, and still other references are placed within the paragraph; thus the reader must be alert to determine the location of the references. There are 17 chapters dealing with various methods used in the clinical laboratory with a comment on the significance of the findings related to disease processes. The author has selected methods which he has found useful in the clinical laboratory. He further emphasizes that the object of this synopsis is to bring together in a small volume for ready reference the more recent information and the most frequently used methods of laboratory diagnosis. This new edition should be of valuable assistance to the technologist in the clinical laboratory as well as to the practicing physician.—*S. A. Levinson.*

■ NEW AND NONOFFICIAL REMEDIES. Council on Pharmacy and Chemistry, American Medical Association. 782 pages. Index. Price $3. Philadelphia: J. B. Lippincott Co., 1951.

New and Nonofficial Remedies (N.N.R.) is a popular and widely used annual publication of the Council on Pharmacy and Chemistry of the American Medical Association. In the medical field, N.N.R. is comparable to Accepted Dental Remedies.

Dentists will be interested to know that all formerly accepted topical penicillin preparations have been omitted from N.N.R. Among the newly listed articles of special interest to dentists are hexachlorophene and several surgical soaps containing this germicide, the sweetening agent cyclamate sodium, and the antibiotics chloramphenicol, bacitracin and terramycin hydrochloride.

Pyridoxine (Vitamin B_6) hydrochloride is now described as having some value in the treatment of irradiation sickness. The human requirement is estimated tentatively as approximately one milligram per day. In the previous edition of N.N.R. pyridoxine was listed for purposes of standardization and experimentation only.

Many acceptable older drugs which were described in the 1949 and 1950 editions of N.N.R. are listed only in the general index to the 1951 edition. This editorial practice, which is to be continued, will result in emphasis on descriptions of the useful newer drugs, concerning which current information is most needed by the practitioner.

N.N.R. is a useful reference book. The policy of annual revision assures the reader of relatively current information concerning drugs of established value. Its low price makes the purchase of a new book each year economically feasible.

■ ROENTGEN ANATOMY—ROENTGEN ANATOMÍA. David Steel, M.D. 109 pages. Price $8. Springfield, Ill.: Charles C Thomas, 1951.

This roentgen atlas is designed for quick reference. It is especially useful to those who must make occasional readings of extraoral and general skeletal roentgenograms. Dentists and students will find the identification of landmarks extremely useful. There are, for example, 63 landmarks identified in the lateral roentgenogram of the skull. Roentgenograms are illustrated of the adult only. The quality of reproductions are average. In common with most printed roentgenograms, the landmarks identified are usually visible. The roentgenograms are not reversed but are printed in the way in which they appear on viewing the original. For the Spanish speaking person, or a student of the Spanish language, a great asset of the atlas is the identification of all landmarks in both English and Spanish. The book is recommended for every serious student of roentgenology.—*William Ward Wainwright.*

■ CYTOLOGIC CHANGES OF ORAL EPITHELIUM IN NUTRITIONAL DEFICIENCIES. Renzo Toaff and Jehuda M. Bromberg. Am. J. Clin. Path. 21:536, June, 1951.

Deficiency of vitamins, especially those of the B complex, may induce pathologic changes in the mouth. The purpose of the present investigation was to determine if cytologic changes occurred in oral epithelium in such nutritional deficiencies. Since it has been demonstrated that the sex hormones produce changes in the oral mucosa, the authors considered that changes induced by vitamin deficiencies might be better evaluated after exclusion of such hormonal factors. They, therefore, selected for this study women in the post-menopausal period who presented evident oral manifestations of nutritional deficiency and lack of endogenous estrogen, as shown by atrophic vaginal smears. The frequent occurrence of outspoken evidence of nutritional deficiency in the oral structures offered abundant material for study.

Observations were made on two groups of women, the first (control group) comprising 22 healthy women whose ages ranged from 45 to 62 years, and the second (deficiency group) comprising 19 women of the same age group with various oral manifestations of nutritional deficiency.

The presence of incomplete and complete cornification in the oral smears of women in the post-menopausal period, who are suffering from atrophic glossitis, angular stomatitis, cheilosis and corneal vascularization, seems to indicate that both incomplete and complete cornification of the oral epithelium are related to nutritional deficiency, inasmuch as the oral smears of healthy women in the post-menopausal period have an entirely different pattern. The observation of incomplete cornification in the oral smear of 3 normal subjects suggests that cytologic changes in the oral epithelium may be present in a state of subclinical deficiency and precede the appearance of oral lesions. It has been assumed that cornification of the oral mucosa is a response to estrogenic stimulation since parallel changes, as far as cornification is concerned, were observed in the oral and vaginal epithelium during the menstrual cycle or as a result of estrogenic stimulation. The authors state that their observations offer evidence that cornification of the oral mucosa may appear after the menopause while no demonstrable estrogenic action is present, as shown in the patients by a constant "atrophic" pattern in the vaginal smear.—*Myron Kaufman.*

■ NERVE ANASTOMOSIS IN THE TREATMENT OF FACIAL PARALYSIS: SPECIAL CONSIDERATION OF THE ETIOLOGIC ROLE OF TOTAL REMOVAL OF TUMORS OF THE ACOUSTIC NERVE. J. Grafton Love and Bland W. Cannon. Arch. Surg. 62:379, March, 1951.

A follow-up study of 61 of 87 patients who underwent nerve anastomosis for unilateral facial palsy was presented. The results have shown that whenever possible the spinal accessory nerve should be employed to conduct impulses to the facial musculature in cases in which re-establishment of the continuity of the facial nerve is impossible. Although perfect function cannot be expected, particularly in regard to emotional responses, the nerve anastomosis does offer satisfactory re-innervation in the majority of cases.

Evidence showed that the duration of the facial palsy is not as important a consideration in the selection of candidates for spinofacial anastomosis as has been previously thought.

Definite atrophy of the facial muscles, on the other hand, militates against a good functional recovery.

Consideration of the status of the fifth cranial nerve in cases in which a tumor of the cerebellopontile angle has been removed is important in predicting the expected result of spinofacial anastomosis. When a patient with a benign tumor of the cerebellopontile angle, particularly with a neurofibroma of the eighth cranial nerve, presents himself for treatment, complete removal of the tumor is desirable even though it means sacrificing the seventh cranial nerve. The residual dysfunction of the spinofacial anastomosis is a small price to pay for a cure of a brain tumor that otherwise might cause the death of the patient.

Undesirable symptoms involving the shoulder from utilizing the spinal accessory nerve are almost never observed. It should go without saying that no good can be accomplished unless the spinal accessory nerve was intact and functioning normally prior to the anastomosis with the facial nerve.

The most successful surgical anastomosis will fail to give a good functional result unless the patient is intelligent, cooperative and willing to practice conscientiously in striving to dissociate shoulder and facial movement.—*J. K. Paul.*

■ FRACTURE OF THE ZYGOMA. Radford C. Tanzer. Plast. & Reconstruct. Surg. 7:400, May, 1951.

The pathologic anatomy and diagnosis of fractures of the zygoma are discussed. The author studies suspected malar fractures by roentgenograms taken in the Waters position and in the vertico-submental plane in order to identify accurately the nature of the displacement.

Proper treatment comprises two basic phases; (1) reduction of the fracture and (2) maintenance of position. This is accomplished by either an intra-antral or extra-antral procedure. A historical review of treatment over the past 50 years is presented. The author's preference in treatment is for reduction via the temporal approach as described by Gillies, Kilner and Stone. An incision is made within the hair line in the temporal region, the temporal vessels are identified and retracted, and a no. 20 Hegar dilator is introduced through a small incision in the temporal fascia and passed deep to the zygomatic ridge into the antral cavity.

Impactions of at least two weeks' duration can be broken up by manipulation through this approach. If this approach does not create an impaction of the malar fragments in a reduced position fixation is then obtained under the same anesthetic by the use of a tantalum wire threaded through the infraorbital ridge and attached to a head appliance. The author prefers a direct approach to the ridge and describes in detail his procedure. He further has devised a simple head cap which can quickly be constructed, accurately adjusted, easily removed, and employs the principle of balanced elastic support. Its use is not confined to malar fractures but affords fixation for some nasal and maxillary fractures with equal effectiveness.

The methods of treatment and results of surgical reduction of 17 malar fractures are reported.—*Myron Kaufman.*

■ ALTERATIONS IN THE BACTERIAL FLORA OF THE THROAT DURING ORAL THERAPY WITH AUREOMYCIN. Manson Meads, Wallace P. Rowe and Nancy M. Haslam. Arch. Int. Med. 87:533, April, 1951.

Short courses of treatment with aureomycin produced notable alterations in the aerobic bacterial flora of the normal nasopharynx. Like penicillin, this drug caused a rapid decrease in the total number of bacteria in the throat, resulting in a growth of gram-negative species which gradually become predominant. Unlike penicillin, aureomycin quickly eliminated the hemophilus group of organisms from throat cultures and did not permit the appearance of coliform species.

Pharyngeal strains of alpha streptococci and neisseria demonstrated slight but significant increases in their resistance to aureomycin and penicillin as a result of therapy with these drugs. Except in the neisseria group of organisms, persistence of these increases in re-

sistance could not be demonstrated in strains recovered three months after therapy was discontinued. At the end of this time, the neisseria had retained their resistance to penicillin but not to aureomycin.

During treatment with penicillin, gram-negative bacilli or drug-fast staphylococci may become predominant in the nasopharynx and initiate a new bacterial infection. Bacteriologic studies made during the administration of aureomycin suggest that its broader spectrum of antibacterial activity will minimize this hazard. —*J. K. Paul.*

■ Antibiotic Sensitivity and Moniliasis. A. J. Reiches. Arch. Dermat. & Syph. 64:604, November, 1951.

Antibiotics, such as aureomycin, chloromycetin and terramycin, apparently interfere with the various factors which limit the growth of *Candida (Monilia) albicans*. In the oropharynx this is particularly pertinent where a symbiotic limiting factor prevents organisms, a large number of which may be pathogenic, from stimulating the development of pathologic disturbances.

Since Candida ordinarily will not bring about symptoms without actual invasion of the skin or mucous membranes, it is possible that the effect the antibiotics have on the intestinal flora; that is, decreasing vitamin B complex synthesis, may cause lowering of tissue resistance, thereby inviting invasion. In addition, monilial infiltration is likely to be a sequela to the tissue changes produced by a sensitization reaction of the specific antibiotic agent.—*Bruce L. Douglas.*

■ Congenital Deformity of the Maxilla and Mandible. Varaztad H. Kazanjian. Plast. & Reconstruct. Surg. 7:396, May, 1951.

Any deviation of the mandible or its supporting structures from the normal, which affects the functioning of the jaws and causes distortion of the facial appearance, may be classed as a deformity. Such deformities may be caused by (1) acute and chronic diseases of the mandibular bone, (2) tumors of various types, (3) injuries, or (4) congenital or developmental defects. The case which is described in this paper is congenital in origin and involves both the upper and lower jaws.

Examination of the jaws showed a retrusion of the mandible; irregular upper teeth; narrow maxillary arch; high palatal vault and protruding premaxilla. There was only one large central incisor at the median line of the upper jaw. The other central tooth was missing and there was no evidence that it had been lost by extraction. The most conspicuous part of the jaw deformity was the excessive "open bite."

A bilateral osteotomy of the mandible anterior to the molars was done and the anterior part of the jaw shifted forward to raise the jaw to occlude with the upper teeth. In the meantime the excessive protrusion of the anterior region of the maxilla was reduced by extraction of the anterior teeth, and excision of a certain amount of alveolar bone, thus enabling the patient to wear an artificial denture to improve the facial outline.—*Herbert J. Bloom.*

■ Fractures of the Facial Bones. W. Raymond McKenzie. Arch. Otolaryng. 52:257, August, 1950.

Fractures of the facial bones may be divided into four groups: (1) fractures of the nasal bones (recent and old); (2) fractures of the malar bone and superior maxilla (recent and old); (3) fractures of the mandible; (4) fractures of all the facial bones.

The article is limited in scope to injuries of the nose and malar-zygomatic arch, because these structures are the bones most frequently injured because of their prominence in the face. Repair of saddle nose, crooked nose, or humped nose, correction of deflections and deformities of the columella and anterior septal margin and repair of fractures of the malar-zygomatic arch are discussed.

Recent injuries should be treated as soon as practicable. Old fractures should be corrected as soon as the patient becomes aware of a deformity. Deformities of the internal and ex-

ternal nose should be corrected as successive steps in a single procedure.

Choice of anesthesia depends on the type and severity of the injury, the age and mental attitude of the patient and the judgment of the surgeon.

Results will be uniformly good if all the details of good surgical technic and practice are observed.—*Herbert J. Bloom.*

■ THE INCIDENCE OF DISTANT METASTASES AMONG PATIENTS DYING WITH HEAD AND NECK CANCERS. L. F. Peltier and others. Surgery 30:827, November, 1951.

For many years the incidence of remote metastases among patients with head and neck cancers has been considered to be low, though some more recent reports have indicated a greater incidence than previously tabulated. In an effort to reconcile these divergent opinions and increase knowledge which has a direct bearing on the problem of therapy, the authors undertook a survey of 200 autopsies.

The autopsy protocols revealed 34 cases (17 per cent) with metastases below the clavicle. Respiratory complications accounted for the immediate death of 120 of these patients. Among the 34 patients with distant metastases, 28 showed a cervical lymph node involvement. A search should be made in operative specimens and at autopsy for evidence of invasion by tumor of the large veins of the neck.—*Bruce L. Douglas.*

■ CROSS-RESISTANCE TO ANTIBIOTICS. Thomas M. Gocke and Maxwell Finland. J. Lab. & Clin. Med. 38:719, November, 1951.

The development of increased resistance of bacteria in the course of exposure to antibiotics, both *in vitro* and during therapy, is well recognized. The clinician, faced with an infection by an organism which has become resistant in the course of antibiotic therapy, and before that infection has been eradicated, may have to resort to other agents. It is, therefore, important to know whether the resistance so acquired is limited to the agent to which the organism had been exposed or extends to other antibiotics which may then likewise prove ineffective for continuing the therapy. The mechanisms whereby effective antibiotics exert their antimicrobial action are not established. It seems likely, however, that the acquisition of resistance is intimately related to these modes of action. Furthermore, the introduction of antibiotics with different chemical and physical properties but with wide and similar antimicrobial spectra suggests that such antibiotics may exert their action, at least in part, along some common metabolic pathways. It is, therefore, of additional interest to determine whether cross-resistance develops among these related antibiotics. Likewise, the development of strains dependent for growth on any given antibiotic may offer an opportunity to determine whether the growth promoting property of that antibiotic could be supplied by other agents.

In the present study an attempt was made to increase the resistance of a number of organisms to each of four antibiotics—namely, aureomycin, terramycin, chloramphenicol and neomycin—by repeated subculture on increasing concentrations of the individual agents. These organisms and the same strains subcultured on the same media but in the absence of antibiotics were then tested for sensitivity to all four agents. Some of the organisms were tested also with penicillin and streptomycin. The development of increased resistance to the homologous and heterologous antibiotics varied with the antibiotics and with the strains which had been exposed to them. Resistance to the homologous antibiotic increased most regularly and most rapidly to neomycin; this also occurred regularly, though not so strikingly with terramycin. Increased resistance to aureomycin and chloramphenicol occurred in some strains but not in others following their exposure to these respective agents. Repeated exposures to aureomycin or terramycin resulted in the development of mutual cross-resistance to these agents most regularly and clearly. The results with chloramphenicol varied with the organism. Following exposures to that agent, some strains developed significantly increased resistance to aureomycin

or terramycin, or to both, while others did not. Conversely, some strains rendered resistant to either aureomycin or terramycin also developed significantly increased resistance to chloramphenicol, while such was not the case with other strains. Organisms rendered resistant to neomycin as a result of repeated subcultures on this antibiotic showed no increase in resistance to aureomycin, terramycin, or chloramphenicol, and in some instances appeared to become more sensitive to these three agents. Conversely, strains which had increased in resistance to aureomycin, terramycin, or chloramphenicol generally showed unchanged sensitivity to neomycin. Almost all of the strains which had increased in resistance to neomycin, however, also increased significantly in resistance to streptomycin. None of the strains tested had changed in their sensitivity to penicillin as a result of repeated exposures to aureomycin, terramycin, chloramphenicol or neomycin.—*Myron Kaufman.*

■ Studies on Antibiotic Synergism and Antagonism: The Interference of Chloramphenicol (Chloromycetin) with the Action of Penicillin. E. Jawetz and others. Arch. Int. Med. 98:349, March, 1951.

Antagonistic effects between chloramphenicol and penicillin were demonstrated *in vitro* with both gram-positive (streptococcus) and gram-negative (klebsiella) organisms and *in vivo* in a streptococcic infection of mice. The antagonism between the two drugs extends over wide ranges of concentrations of each drug but is limited by the degree of antimicrobial activity of the drugs. The phenomenon was observed *in vivo* when the drugs were given at different sites in either single or multiple injections. However, antagonism occurred only if chloramphenicol was given prior to, or simultaneously with, penicillin; not if penicillin was administered first. Drugs synergistic with penicillin—streptomycin or bacitracin—overcame the antagonism between chloramphenicol and penicillin.

Evidence was presented to indicate that the phenomenon was not one of mutual antagonism between the two drugs but rather an interference of chloramphenicol with the early bactericidal, or therapeutic, effect of penicillin. The two drugs do not appear to interact in a physical or chemical way resulting in inactivation, but probably chloramphenicol modified the characteristics of the bacterial population so as to make it less susceptible to penicillin action.—*J. K. Paul.*

■ Oral Manifestations of Toxicity Following Antibacterial Therapy. Austin B. Kutscher. New York D. J. 17:261, July, 1951.

An exhaustive study on the oral effects of all antibacterial agents which have been in use since 1936 was made. One hundred and eighteen references are listed and every conceivable type of oral reaction found in the literature is mentioned and carefully tabulated.

Probably the most important portion of this research covers the local effects of the stronger antibiotic agents on the gastrointestinal tract and the oropharyngeal flora. Since some of these drugs have a powerful contact-bactericidal effect, a great many of the bacteria of the oral and intestinal flora, some essential for physiologic synthetization of vitamins and the maintenance of oral symbiosis, are destroyed or inactivated during therapy. This has led to the premonition that vitamin B complex must consequently be replaced, vitamin K must be reinforced and oral monilial fungi, during symbiotic imbalance, can produce moniliasis.

The oral reactions may result from local contact sensitization; they may be a part of a systemic condition or the side effect of one of the more basic developments. The course and prognosis of the reactions are discussed briefly and, when indicated, high vitamin B administration and antihistaminic drugs may be used therapeutically. The application of a fungicide, or switching to another agent, may also aid in eliminating symptoms.—*Bruce L. Douglas.*

■ STUDIES ON ANTIBIOTIC SYNERGISM AND ANTAGONISM: THE INTERFERENCE OF AUREOMYCIN, CHLORAMPHENICOL AND TERRAMYCIN WITH THE ACTION OF STREPTOMYCIN. Ernest Jawetz, Janet B. Gunnison and R. S. Speck. Am. J. M. Sc. 222:404, October, 1951.

The availability of a number of satisfactory antimicrobial agents makes the use of combinations of these agents tempting to the clinician. The increasing frequency of drug-resistant microorganisms often makes such use necessary. Although the indiscriminate administration of antibiotic mixtures should not be condoned, it is virtually certain to increase in the everyday practice of medicine. Following the introduction of each new drug, resistant bacteria are discovered soon and the physician feels forced to resort to combinations of drugs in the hope of obtaining additive or synergistic effects. Because of this manifest need, studies have been undertaken to define some of the effects of combined antimicrobial therapy.

Based on *in vitro* and *in vivo* observations, certain drug combinations have been found to exhibit increased effects over the single drugs. Combinations of penicillin with streptomycin or with bacitracin were clearly synergistic in their action against certain bacteria and spirochetes and clinical observation has substantiated this experimental evidence. Conversely, it has been shown experimentally that certain combinations of antibacterial drugs result in antagonism and diminished effect.

Previous publications have dealt with the ability of chloramphenicol, aureomycin, and terramycin to interfere with the bactericidal and therapeutic effects of penicillin. Antagonism was observed in these combinations *in vitro* and in experimental infections of mice with both gram positive and gram negative organisms. The possible mechanism of interference was attributed to the fact that penicillin was most active against rapidly multiplying bacteria and that the "interfering drug" showed multiplication and thus blocked optimal penicillin action. This report deals with the interference of aureomycin, chloramphenicol, or terramycin with the action of streptomycin *in vitro* and in experimental infections of mice.

Aureomycin, chloramphenicol, and terramycin can interfere with the action of streptomycin *in vitro* and in experimental infections of mice. The antagonism is greater with chloramphenicol than with the other two agents. It is a unilateral phenomenon which can be observed only with microorganisms susceptible to streptomycin action.—*Myron Kaufman.*

■ CANCER OF THE TONGUE—A SURGICAL TECHNIQUE FOR A PRIMARY COMBINED EN BLOC RESECTION OF TONGUE, FLOOR OF MOUTH, AND CERVICAL LYMPHATICS. Arnold J. Kremen. Surgery 30:227, July, 1951.

Cancer of the tongue causes about 2 per cent of all cancer deaths and is the cause of more deaths than any other malignant growth of the head and neck. While there appears to be considerable variation in the choice of therapy for the primary intraoral lesion, with opinions divided between radiation therapy, diathermy excision, conventional surgical excision, or combinations of these methods, most people concerned with the problem are in agreement that for management of cervical metastases, radical neck dissection allows the best opportunity for continued survival of the patient. In the surgical management of cancer of the tongue, as in other regions, curative treatment requires consideration of the regional lymphatic spread as well as the site of origin, providing, of course, that the primary site offers promise of being controlled. In the literature varying opinions have been expressed concerning the validity of carrying out extensive surgical procedures to lymphatic bearing areas in the neck if they do not appear to be clinically involved with cancer. Contrary to the situation which exists with cancer of the lip, where the salvage rate is approximately the same for microscopically involved lymph nodes in the "prophylactic" or "therapeutic" groups of cases, in cancer of the tongue those patients with involved lymph nodes do better if these metastases are properly removed before they became large enough to become clinically apparent. The high yield (46 per cent) of pathologically involved nodes and the improved salvage of these cases

would strongly support the thesis that removal of regional lymphatic-bearing tissue should be an essential part of the management of operable cases of cancer of the tongue.

It is the purpose of this paper to present a surgical technic for the management of most cases of cancer of the anterior two-thirds of the tongue which applies classical concepts of cancer surgery to this area; namely, en bloc removal of the primary lesion, intervening lymphatic channels and regional lymph nodes. Such a plan can be effected in cancer of the tongue, with good cosmetic and functional results and, in the 12 cases presented, with no operative mortality. In the light of present experience with antibiotics, infection is no longer a compelling contraindication to such a combined resection, and it is possible therefore to plan and carry out at the same time a more complete en bloc removal of the site of primary growth, floor of the mouth, and glands of the neck.—*Myron Kaufman.*

■ Treatment of Multiple Fractures of Facial Bones. Richard H. Walden. Plast. & Reconstruct. Surg. 8:307, October, 1951.

All fracture therapy depends on reduction and immobilization. Immobilization cannot be accomplished unless some base for support exists.

In the face the nearest bony structure lying cephalad to the fracture site is used for support. The maxilla is employed as the means of sustaining fractured mandibular fragments whereas in maxillary fractures the malar bone is used for support. When the malar bones are fractured in conjunction with caudad facial fractures, the fractures are suspended from the skull itself.

The multiple facial fracture case usually is so severe that it is necessary to do direct bone wiring of the fragments. Adjacent fragments are wired together and then suspended for support by direct cable wires from the next higher solid bony structure. If the jaws are involved they are wired in occlusion, providing sufficient teeth are in position. If patients are edentulous, normal intermaxillary relationship is maintained by making immediate dental splints of quick setting plastic (acrylic). The lower splint is wired in a circumferential fashion to the mandible and the upper splint is suspended by cable wires from the infraorbital ridge or lateral orbital rim.

In treating such cases, the earlier the treatment is instituted the better. Bleeding and shock, of course, are primarily controlled in the usual accepted manner.—*Herbert J. Bloom.*

■ Surgical Anesthesia, Heart Disease and Cardiovascular Responses. H. Gross, P. Stein and A. S. Buchberg. Anesth. & Analg. 30:250, September-October, 1951.

This article deals with a re-evaluation of the physiology of anesthesia, of individual anesthetic agents and the effects of anesthesia on the heart.

Different pathologic conditions present special problems which modify the choice of anesthetic and mode of administration. The rheumatic heart in regular rhythm without cardiac insufficiency offers little problem; following recent acute cardiac infarction, anoxia or a pronounced fall in blood pressure may lead to death; the excitement stage with associated violent muscular exertion and strain may precipitate cardiac infarction from coronary insufficiency.

In instances of long-standing cardiac weakness, vitamin B is especially important for metabolism of the heart muscle and for handling the accumulation of products of tissue metabolism such as pyruvates.

Posture is especially important in the cardiac patient since cardiac output, blood volume and total proteins are greater in recumbency than in the sitting position. Vital capacity is, however, lower in recumbency.

In patients with cardiac disease, the authors advocate induction with one of the rapidly-acting agents and maintenance with ether, which lessens the risk of arrhythmic complications.—*Bruce L. Douglas.*

Announcements

■ American Academy of Dental Medicine

The sixth annual meeting of the American Academy of Dental Medicine will be held May 29-31, 1952, at the Mount Royal Hotel in Montreal, Canada. On May 28, there will be a registered pre-convention seminar of courses on dento-medical subjects.

The program will further include a series of lectures and round table discussions, with sight-seeing and entertainment also planned. All members and interested dentists and physicians are invited. For details and reservations, address William M. Greenhut, 124 East 84th Street, New York 28.

■ Indian Dental College Dedicates New Building

On February 6, 1952, the opening ceremony of the new building of the Nair Hospital Dental College was held in Bombay. The Honorable Rajkumari Amrit Kaur, Minister for Health of the Republic of India, performed the opening ceremony.

The Nair Hospital Dental College was founded in 1933 and now has 115 students, including 23 women students. The school is associated with Nair Hospital, which has 300 beds and is fully equipped in the most modern manner.

■ American Association for Cleft Palate Rehabilitation

The American Association for Cleft Palate Rehabilitation will hold its annual meeting in St. Louis, April 25-26, 1952. The sessions will be held at the Chase Hotel, Washington University Dental and Medical Colleges, and Barnes and Children's Hospitals.

■ Postgraduate Courses in Anesthesia for Dentists at University of Louisville

The department of oral surgery at the University of Louisville will present eight postgraduate courses in anesthesia for graduate dentists this year. The courses will be under the direction of Robert Bergner, chief of anesthesia, and Richard M. Herd, chief of oral surgery.

Further information may be obtained by writing to the chairman of the Postgraduate Committee, University of Louisville School of Dentistry, Louisville, Ky.

■ West Virginia to Erect Medical-Dental Center

West Virginia University announced on January 28, 1952, that plans are being drafted for the construction of buildings to house the state's new four-year medical, dental and nursing education program.

The buildings are to be constructed on a 145-acre site less than a mile from the present campus at Morgantown, W. Va. Plans also call for a 600 bed hospital to provide bedside instruction in medicine, dentistry and nursing.

■ Ninety-third Annual Session of the American Dental Association

The American Dental Association will hold its ninety-third annual meeting in St. Louis, September 8-11, 1952. Scientific sessions will include a general meeting of all sections to discuss antibiotics in dentistry and the foci of infection theory.

The Association's Board of Trustees and House of Delegates will convene for official business meetings and elections. The Association anticipates an attendance of 15,000 dentists.

■ International Dental Congress Scheduled to Meet in London

The eleventh International Dental Congress, sponsored by the Fédération Dentaire Internationale, will be held in London, July 19-26, 1952. Scientific reports to be presented for discussion at the Congress will be published in the four issues of the *International Dental Journal* dated September 1951 to June 1952.

For further information write to G. H. Leatherman, Honorary Secretary, 13 Hill Street, London, W. 1.

■ Graduate and Postgraduate Studies at Tufts College Dental School

Courses in minor oral surgery will be presented throughout the academic year of 1951-1952. Tuition will be $100 for the period from June 2 to 6, 1952.

Information may be obtained by writing to the director of the Division of Graduate and Postgraduate Studies, Tufts College Dental School, 136 Harrison Avenue, Boston 11.

■ Third Annual Berkshire Conference in Periodontology and Oral Pathology

The Division of Graduate and Postgraduate Studies of Tufts College Dental School will conduct the third annual Berkshire Conference in Periodontology and Oral Pathology at Eastover, a resort hotel in Lenox, Mass., June 15-19, 1952. The conference will consist of four days of lectures, seminars and panel discussions regarding clinical problems by outstanding teachers and clinicians in dentistry, medicine and their related fields.

For further information regarding this conference write to the Berkshire Conference, Tufts College Dental School, 136 Harrison Avenue, Boston 11.

■ Postgraduate Training at New York University College of Dentistry

The periodontia department of New York University College of Dentistry announces its full-time course in periodontia and oral medicine for one academic year, September 22, 1952, to May 22, 1953, leading to a certificate. The course is limited to four.

Half-time, two year courses are also given, as well as a three weeks refresher course beginning June 2, 1952. All courses are under the direct supervision of Dr. Samuel Charles Miller.

For further information write Postgraduate Division, New York University College of Dentistry, 209 East Twenty-third Street, New York 10.

■ Southeastern Society of Oral Surgeons

The third annual meeting of the Southeastern Society of Oral Surgeons will be held at the Hollywood Hotel in Hollywood, Fla., April 11-12, 1952. Further information may be obtained from George W. Matthews, 1922 Tenth Avenue South, Birmingham, Ala.

■ Chalmers Lyons Academy to Observe Silver Anniversary at Michigan State Dental Society Meeting

The twenty-fifth anniversary of the Chalmers Lyons Academy of Oral Surgery will be observed on April 23-25, 1952, in conjunction with the meeting of the Michigan State Dental Society at the Hotel Statler, Detroit. The entire oral surgery program at the meeting will be presented by the members of the Chalmers Lyons Academy.

■ American Dental Society of Europe Plans Summer Meeting in London

The American Dental Society of Europe will meet July 15-18, at the Royal College of Surgeons in London, England. All United States dentists who will be in Great Britain this summer have been invited to attend the meeting. Further information may be obtained from F. Douglas Derrick, 140, Park Lane, London, W.1.

■ Metropolitan New York Society of Oral Surgeons to Hear Frank S. Butler

The Metropolitan New York Society of Oral Surgeons will meet at 8:00 P.M., May 7, 1952, at the Hotel New Yorker. The meeting will be addressed by Frank S. Butler, M.D., of New York City, attending surgeon at Bellevue and University Hospitals and chief of the Columbus Hospital Tumor Clinic. Dr. Butler is also attending surgeon to the oral surgery department of the New York University School of Dentistry and Tumor Clinic. His subject will be "Diagnosis and Treatment of Malignant Diseases of the Mouth."

Preceding the meeting, a dinner in honor of Dr. Butler will be held at 6:00 P.M., according to Harry Seldin, president of the Society.

Editorial communications

■ ORIGINAL COMMUNICATIONS—This journal invites concise original contributions in the broad field of clinical and experimental surgery of the mouth and associated structures, including roentgenology, diagnosis, anesthesia and oral surgical pathology. Articles are accepted for publication with the understanding that they are contributed solely to the JOURNAL OF ORAL SURGERY. All manuscripts are subject to editorial modification. Neither the editors nor the publishers accept responsibility for the views and statements of authors expressed in their communications.

■ MANUSCRIPTS—Manuscripts submitted for publication should be sent to Reed O. Dingman, Editor, 221 North Ingalls Street, Ann Arbor, Michigan.

Manuscripts should be typewritten on one side of the paper only with double spacing and liberal margins. The author's name and the abbreviated title of the article should appear at the top of each manuscript page. The original should be sent to the editor and a carbon copy retained by the author. Manuscripts will not be returned if accepted for publication.

References should be placed at the end of the article and should conform to the style of the Quarterly Cumulative Index Medicus; viz., name of author, title of article and name of periodical with volume, pages, month and year. They should be numbered and should appear in the same order as that of the superior figures inserted in the appropriate positions in the text.

■ ILLUSTRATIONS—Illustrations accompanying manuscripts should be unmounted and numbered. The author's name should appear on the margin or back.

Authors should insert figure numbers at appropriate places in the text. The original drawings, or glossy print photographs of them, should accompany the manuscript. Legends for illustrations are to be typewritten in a separate list with numbers corresponding to those on the photographs and drawings.

A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editors for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered in India ink or with black typewriter ribbon (carbon paper placed with carbon against back of sheet for bolder type). Ordinary blue or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

■ CASE REPORTS—Case reports will constitute an important department of the journal and the editors welcome case reports that are of unusual clinical value or that present exceptional conditions of interest to dental surgeons.

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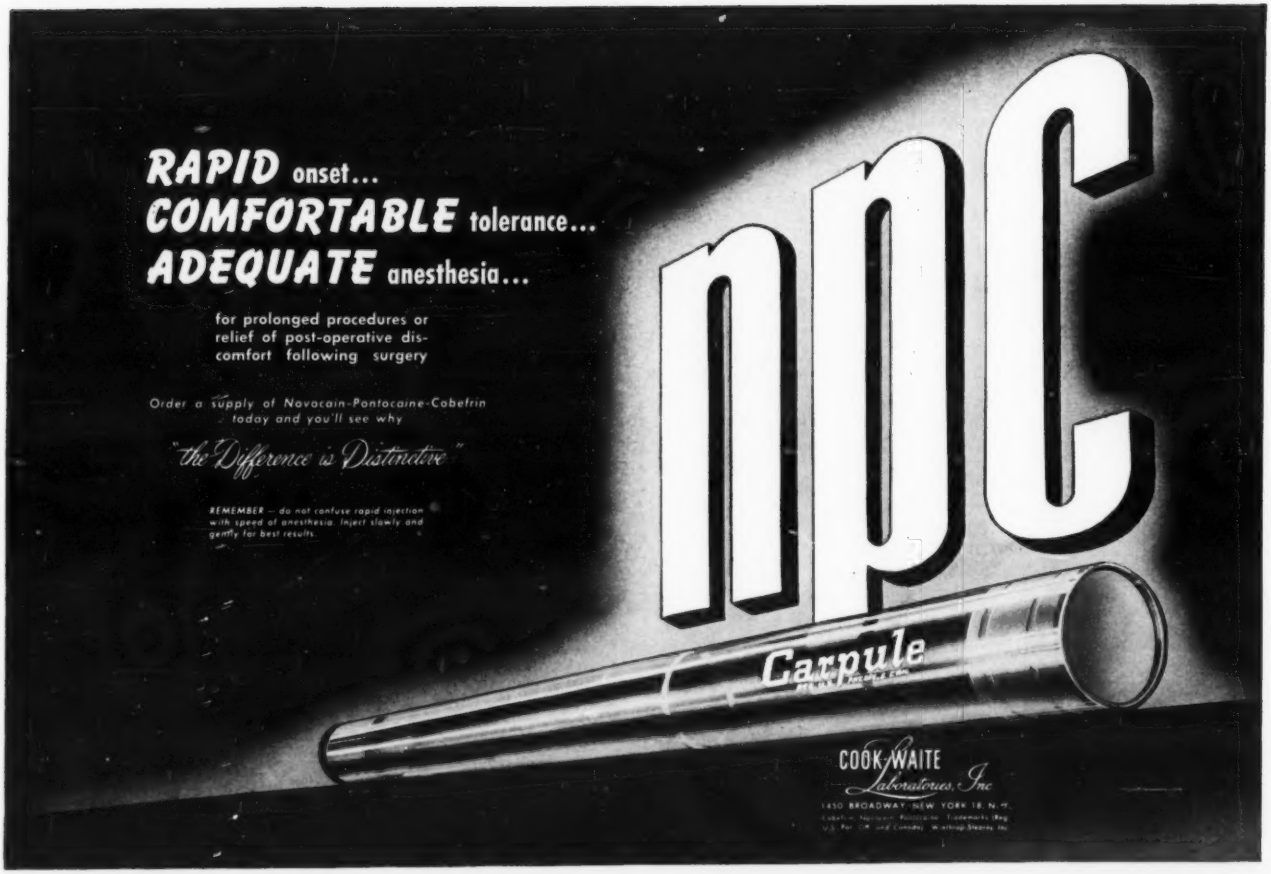
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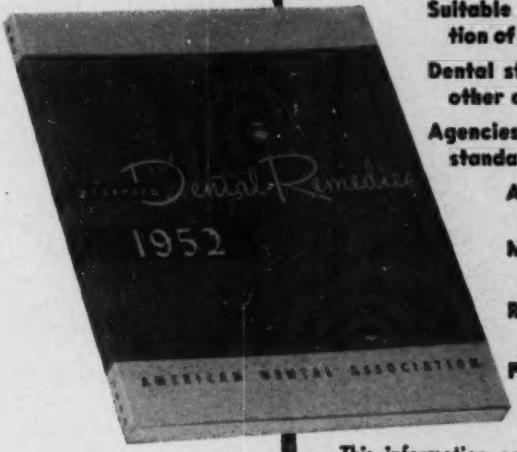

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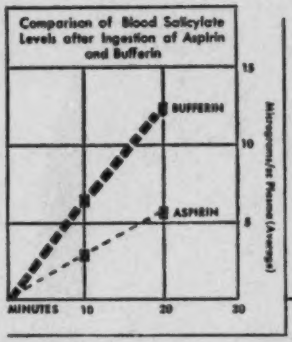

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